

**A Thesis Submitted for the Degree of PhD at the University of Warwick**

**Permanent WRAP URL:**

<http://wrap.warwick.ac.uk/93387>

**Copyright and reuse:**

This thesis is made available online and is protected by original copyright.

Please scroll down to view the document itself.

Please refer to the repository record for this item for information to help you to cite it.

Our policy information is available from the repository home page.

For more information, please contact the WRAP Team at: [wrap@warwick.ac.uk](mailto:wrap@warwick.ac.uk)



# Individual Characteristics and Mood Effects on Strategic Interactions

by

**Mahnaz Nazneen**

**Thesis**

Submitted to the University of Warwick

for the degree of

**Doctor of Philosophy**

**Department of Economics**

June 2017

THE UNIVERSITY OF  
**WARWICK**

# Contents

<b>List of Tables</b>	<b>iv</b>
<b>List of Figures</b>	<b>v</b>
<b>Acknowledgments</b>	<b>vii</b>
<b>Declarations</b>	<b>viii</b>
<b>Abstract</b>	<b>ix</b>
<b>Abbreviations</b>	<b>x</b>
 <b>Chapter 1 Gender Roles and Bargaining Behaviour: A Lab Experiment in Bangladesh</b>	 <b>1</b>
1.1 Introduction . . . . .	1
1.2 Literature Review . . . . .	5
1.2.1 Bangladesh: some empirical evidence . . . . .	8
1.3 Experimental Design . . . . .	10
1.3.1 The Game . . . . .	10
1.3.2 The Treatment . . . . .	11
1.3.3 Questionnaire . . . . .	12
1.3.4 Implementation . . . . .	12
1.4 Results and Discussions . . . . .	13

1.4.1	Proposer Behaviour . . . . .	14
1.4.2	Responder Behaviour . . . . .	15
1.5	Conclusions . . . . .	18
<b>Chapter 2 Cooperation and Positive Mood in Repeated Interactions</b>		<b>30</b>
2.1	Introduction . . . . .	30
2.2	Experimental Design . . . . .	35
2.2.1	Mood Induction Procedures . . . . .	35
2.2.2	The Game . . . . .	36
2.2.3	Pre-play Communication & Belief Elicitation . . . . .	37
2.2.4	Questionnaire . . . . .	38
2.2.5	Implementation . . . . .	38
2.3	Results . . . . .	39
2.3.1	Comparative Statics across Treatments . . . . .	39
2.3.2	Best Response Dynamics and Basins of Attraction . . . . .	40
2.3.3	Accuracy of Beliefs . . . . .	42
2.3.4	Text Analysis of the Pre-play Communication . . . . .	42
2.4	Concluding Remarks . . . . .	43
<b>Chapter 3 Mood, Risk and Belief: Motivations in Social Dilemma</b>		<b>58</b>
3.1	Introduction . . . . .	58
3.2	Literature Review . . . . .	60
3.3	Experimental Design . . . . .	63
3.3.1	Mood Induction Process . . . . .	63
3.3.2	The Games . . . . .	64
3.3.3	Questionnaire . . . . .	66
3.3.4	Implementation . . . . .	67
3.4	Results and Discussion . . . . .	68
3.5	Conclusions . . . . .	73

<b>Bibliography</b>	<b>81</b>
---------------------	-----------

<b>Appendices</b>	<b>A.1</b>
-------------------	------------

A	Chapter 1: Advertisement for study participation . . . . .	A.1
B	Chapter 1: Experiment Dates . . . . .	A.2
C	Chapter 1: Picture of the laboratory . . . . .	A.3
D	Chapter 1: Experiment Instructions . . . . .	A.4
E	Chapter 1: Histogram of offers . . . . .	A.7
F	Chapter 2: Experiment Dates . . . . .	A.8
G	Chapter 2: Experiment Instructions . . . . .	A.9
H	Chapter 2: Basin of Attraction Computations . . . . .	A.13
I	Chapter 3: Experiment Dates . . . . .	A.18
J	Chapter 3: Experiment Instructions . . . . .	A.19
K	Chapter 3: Encryption Task . . . . .	A.25
L	Chapter 3: Histogram of offers . . . . .	A.25
M	Chapter 3: GMAT questions . . . . .	A.27
N	Velten Statements . . . . .	A.29
O	Big Five Personality . . . . .	A.34
P	Risk Preference DOSPERT item . . . . .	A.38

# List of Tables

1.1	Gender perceptions based on WVS . . . . .	21
1.2	Differences in mean across treatments . . . . .	22
1.3	Differences in mean proposer offer . . . . .	22
1.4	Differences in mean responder MAO . . . . .	26
1.5	Regression estimation for responder MAO . . . . .	29
2.1	Stage Game . . . . .	45
2.2	Differences in mean across treatments . . . . .	45
3.1	Differences in demographic characteristics across mood . . . . .	75
3.2	Regression estimation for contribution in PG game . . . . .	77
3.3	Regression estimation in the Trust game . . . . .	79
3.4	Differences in response time (seconds) across mood . . . . .	80
A.1	Stage Game . . . . .	A.13

# List of Figures

1.1	The game tree . . . . .	21
1.2	The average Proposer offer, split by gender . . . . .	23
1.3	The average Proposer offer, split by partner's gender . . . . .	24
1.4	The average Proposer offer, split by gender pairs . . . . .	25
1.5	The average Responder MAO, split by gender . . . . .	26
1.6	The average Responder MAO, split by partner's gender . . . . .	27
1.7	The average Responder MAO, split by gender pairs . . . . .	28
2.1	Cooperation rates in the different treatments . . . . .	46
2.2	Cooperation rates in the different treatments in the sessions with beliefs. . . . .	47
2.3	Average payoffs in the different treatments. . . . .	48
2.4	Average payoffs in the different treatments in the sessions with beliefs. . . . .	49
2.5	Cooperation rates per round in the different treatments. . . . .	50
2.6	Cooperations rates per round in the different treatments in the sessions with beliefs . . . . .	51
2.7	Cooperative choices consistent with beliefs in the first round. . . . .	52
2.8	Choices consistent with beliefs in the first round. . . . .	53
2.9	Errors in the beliefs about partners' choices in the first rounds. . . . .	54
2.10	Errors in the beliefs about partners' choices. . . . .	55
2.11	Emotions in the text analysis of the chat . . . . .	56
2.12	Use of the pronoun "I" in the text analysis . . . . .	57

3.1	The self reported mood of the participants . . . . .	75
3.2	The correct encryptions in real effort task . . . . .	76
3.3	The average contribution in the 2-person Public Goods Game. . . .	77
3.4	The average offer in the 2-person Gift Exchange Game. . . . .	78
3.5	The average return in the 2-person Gift Exchange Game. . . . .	78
3.6	The average score on 5 GMAT questions . . . . .	80



# Acknowledgments

Firstly, I would like to thank my supervisors Daniel Sgroi and Eugenio Proto for their relentless support, mentorship and guidance in shaping my ideas over the last few years. Special thanks to the Department of Economics, Warwick for the funding of my research and BRAC University, Bangladesh for allowing me to use their resources for research purposes.

Too many people deserve heartfelt gratitude for indulging me with stimulating conversations and unique perspectives during the course of my programme of study. These include, but are not limited to, Andis, Spyros, Anna, Raghul, my peers and colleagues at the University of Warwick, participants in various conferences and respected faculty and staff members at the department of Economics.

On a personal note, I would like to thank my family, my father for always inspiring me to follow my ambitions, my brother for accepting living 5000 miles apart and my mother who probably would have been proudest for all that I have achieved in life. Finally, I would like to thank my husband Bahzad, who has been a constant source of encouragement and support, sometimes distractions; but mostly for helping me find perspective on things that truly matter in life.

# Declarations

This thesis is submitted to the University of Warwick in support of my application for the degree of Doctor of Philosophy. It has been composed by myself and has not been submitted in any previous application for any degree.

The work presented (including data generated and data analysis) was carried out by the author except in the cases outlined below:

## **Chapter 1: Gender Roles and Bargaining Behaviour**

Solely the author's own work.

## **Chapter 2: Cooperation and Positive Mood in Repeated Interaction**

This chapter is joint work with Eugenio Proto and Daniel Sgroi. The experiment design was finalised after joint discussions with co-authors Eugenio Proto and Daniel Sgroi, the experiment codes and sessions were run by the author, the findings were result of joint discussions with co-authors.

## **Chapter 3: Mood, Risk and Belief: Motivations in Social Dilemma**

This chapter is joint work with Daniel Sgroi. The experiment design was finalised after joint discussions with co-author, the experiment codes and sessions were run by the author, the findings were result of joint discussions with co-author, the paper was written by the author.

# Abstract

This thesis aims to answer questions on heterogeneity found in individual decision making owing to differences in preferences and motives.

In the first chapter I examine how individual's gender affects bargaining behaviour in an Ultimatum Game. I use a method of *priming* to make differences in gender roles salient. The results show that due to the prime, both men and women responder ask for a lower minimum acceptable offer when they are partnered with a male proposer, after controlling for personality traits, intelligence and risk preferences. Regardless of their gender, the prime influences behaviour of both men and women in a similar manner. Also, consistent with the literature, I find no significant difference in the Proposer behaviour.

The second chapter looks at the relationship between induced mood and cooperative behaviour in a repeated interaction using the Prisoner's Dilemma game. We find that players with an induced positive mood tend to cooperate *less* than players in a neutral mood setting. This difference is highest in settings with an uncertain number of repetitions and with no communication. We find that the difference is driven by both less accurate beliefs about partners' choices and a less rational reaction to these beliefs among the players in the positive mood treatment. This interpretation of the data is corroborated by a systematic analysis of the text used during communication.

The third chapter looks at the idea of multiple motives in social dilemma, using the Public Goods game and the Trust game. We look at the causal effect of mood, risk and beliefs, and find that people in positive mood put in more effort compared to people in neutral mood and perform better in the cognitive intelligence test. However, we find that mood in presence of ambiguity is overpowered by beliefs and decisions in public goods game and trust games are driven mostly by belief rather than participant's mood.

# Abbreviations

BDT Bangladeshi Taka

DOSPERT Domain Specific Risk Attitude Scale

DRAW Decision Research at Warwick

GBP Great British Pound

MAO Minimum Acceptable Offer

MIP Mood Induction Process

PD Prisoner's Dilemma

PG Public Goods

RPM Raven Progressive Matrices

SG Super-games

SRT Social Role Theory

ToM Theory of Mind

UG Ultimatum Game

WB World Bank

WVS World Values Survey

Z-Tree Zurich Toolbox for Ready-made Economic Experiments

## Chapter 1

# Gender Roles and Bargaining Behaviour: A Lab Experiment in Bangladesh

### 1.1 Introduction

The literature suggests there are systematic differences in behaviour driven by the gender of an individual. In general, women are thought to be more pro-social and having stronger other regarding preferences. One area of interest is differences in bargaining behaviour. Bargaining has implications in our day to day life, from trading over goods and services, performing salary negotiations to acquiring better jobs or promotions. Holm (2000) in his paper suggests that it is possible that women and men are locked into a convention to discriminate women in some bargaining situations. He also shows that information about the opponents gender seemed to be used as a coordination signal and affects economic behaviour in a statistically significant way towards discrimination of women. Different mechanisms have been proposed that can potentially explain gender differences in bargaining behaviour. Notable examples include differences in competitiveness, risk preferences and social

preferences, among others (Croson and Gneezy, 2009). Several studies have specifically examined gender differences in bargaining behaviour in the laboratory- but the evidence is mixed.<sup>1</sup> One can argue that some of the documented gender differences are results of methodological differences in the studies (Sutter et al., 2009).

A different view is to suggest that differences in norms associated with gender roles can explain such differences in decisions.<sup>2</sup> However, it is difficult to provide evidence that behaviour is driven by norms identity without controlling for the specific norm, especially with non-experimental data. This paper uses a novel experiment design to test if gender differences can be explained by the Social Role Theory (SRT) which essentially says that, men and women behave differently in social situations and take different roles, due to the expectations that society puts upon them (Eagly et al., 2000). The main idea is that in an interactive context, decisions may be influenced by information about features of the other player. In a similar paper Benjamin et al. (2007) use the idea of *self-categorization theory* where environmental cues called *primes* can temporarily make a certain social category more salient, causing a persons behaviour to tilt more toward the norms associated with the salient category. The marginal effect of a particular category in behaviour can be observed by experimentally varying the salience of that category. In this paper I make expectations about gender roles salient to see if that generates differences in behaviour.

The idea of framing has been used by other researches to exogenously manipulate the information structure to generate a specific framing effect.<sup>3</sup> One can think of social identity- formed from symbols, etiquette, rituals, dress codes and

---

<sup>1</sup>For example, García-Gallego et al. (2012) find that women make lower offers as proposers; whereas Eckel and Grossman (2008) find women are more generous than men; Saad and Gill (2001) show that women are more generous against women and make more equal offers.

<sup>2</sup>Gender role is a type of social role and can be defined as *a set of expectations associated with the perception of masculinity and femininity*. Gender norms can be identified as the prescriptions of gender roles. It is a type of socio-cultural regulation (to encourage socially desirable behaviour). This is a “pattern” of what individuals - as members of a group, or representing a particular social position should do, what is required of them under given circumstances.

<sup>3</sup>See for example, Marchetti et al. (2011) and Kray and Thompson (2004)

segregation to impress on people the notion that certain individuals constituted significantly different categories and were subject to different constraints, to generate framing effects. In some ways this experiment design lends itself to comparisons to real world interactions. Although, it may seem odd to generate gender based expectations artificially, a closer look at most of our social interactions reveals this practice is commonly found- we are reminded of our gender identity in almost everything we do or say. Stereotypes like *women are not as strong as men*, *women are bad in mathematics and science related subjects*, *women are never in charge* or statements like *real men don't cry*, *men are in charge* are statements we hear from a very early age. Of course there are differences in degrees to which a society actually represents such differences in roles, but the knowledge of such gender based identity is present everywhere.

It is often conjectured in the literature that a lot of the gender difference is culture driven and that these differences are more pronounced in developing countries compared to developed countries. One possible explanation for this discrepancy could be different perceptions or expectations associated with specific gender roles and the extent to which such gender roles and norms are pronounced in the society. The experiments in this paper are run in Bangladesh, a model developing country according to World Bank reports, where in spite of strong female participation in labour force, perceptions on gender roles are extremely biased.<sup>4</sup>

In recent years there has been a lot of research on Bangladesh but most of these are concentrated on the ready-made garments RMG sector or micro-credit programmes. Some studies have been done on social preferences but on the rural population. There is limited focus on the student body. With a population of 160 million and a median age of 22, Bangladesh hosts a very young population. It is essential to understand the psyche of this age group in general, and especially on the crucial issue of gender equality and gender norms. The existing survey data presents

---

<sup>4</sup>Evidence presented from World Values Survey data in next section

an incomplete picture as they do not reveal perceptions for bargaining behaviour, nor are they focused on the student body, which is the focal point for this study. This strengthens the need to conduct an experiment in Bangladesh to provide evidence about gender differences in bargaining behaviour. To my knowledge, this is the first lab experiment to be done in Bangladesh with the students. In the future similar studies can be done to get a more general idea about gender roles and differences in behaviour.

I use a two person ultimatum game (UG) to observe bargaining behaviour among 222 university students in a laboratory experiment in Bangladesh. Subjects are randomly assigned to a control or treatment session where in the latter subjects read a 150 word paragraph about how preferences of individuals are heterogeneous and depends on a number of factors including gender. The purpose of the paragraph is to make differences in gender roles salient. Subjects in the treatment sessions read the paragraph, while subjects in control session wait 60 seconds before playing a one shot UG.

The main finding is that in the session where subjects were primed, both men and women *responders* ask for a lower Minimum Acceptable Offer (MAO) when they are partnered with a male proposer, after controlling for personality traits, intelligence and risk preferences. The framing effect is such that subjects expect men to be less generous and lower their expectations. Regardless of their gender, the prime influences behaviour of both men and women in a similar manner and overpowers their initial perception (if any) about gender roles. Also, consistent with the literature, I find no significant difference in the proposer behaviour.

This paper contributes to the existing literature by providing an alternate explanation to the observed gender differences in behaviour using the idea of social role theory. Furthermore, it adds to the very limited literature on lab experiments in developing world, since majority are conducted in the developed countries. Also, it allows for replication, similar studies can be conducted in Bangladesh and other



developing countries in the future.

The rest of the paper is organised as follows: section 1.2 provides a brief review of literature, the experiment design is presented in section 1.3, followed by the main results and discussions in section 1.4. Section 1.5 concludes.

## 1.2 Literature Review

The UG has been used as a tool to measure bargaining behaviour ever since the first experiment by Güth et al. (1982). In the simplest form it is a two person game where player 1 (henceforth proposer) offers a certain amount of money to player 2 (henceforth responder). In the second stage the responder can accept the offer- in which case both players get the amount offered by the proposer, or reject- in which case both players get zero. Game theoretic predictions would indicate that responder accept any positive amount and anticipating this the proposer to offer the smallest amount possible. However, subjects do not play like this in the laboratory. The motivations behind decisions in the ultimatum game are diverse. According to Güth and Kocher (2014) the results from ultimatum experiments reject the narrow orthodox assumption of material opportunism, but they do not necessarily reject rationality in a broader sense, allowing for all sorts of aversion concepts, intrinsic motivations, other-regarding preferences, and emotions. As a consequence, there is much room for research from different perspectives.

There are different variations of this simple game, for example the game can be extended to multiple players; and decision structure can be made simultaneous instead of sequential. In the simultaneous case, known as strategy method, the decision of proposer and responder is recorded simultaneously, where the proposer makes an offer and the responder states a minimum acceptable offer (MAO), instead of a simple yes or no to the offer. The experimenter then matches the offer with the MAO. In a meta analysis study, Oosterbeek et al. (2004) show that on av-

erage the proposer offers 40% of the total amount to the responder. When subjects are relatively inexperienced or strategy method is used, this share is typically larger. As the results come from different countries, meta-analysis provides an alternative way to investigate whether bargaining behaviour in ultimatum games differs across countries and the authors find differences in behaviour of responders (and not of proposers) across geographical regions.

There is substantial evidence of gender differences in preferences, as reviewed in Croson and Gneezy (2009). The authors review gender differences across risk preferences, social preferences and attitude to competition. The main findings suggest that women are more risk averse than men. The authors suggest this can be explained by the difference in affective reaction to risk, men and women differ in their emotional reaction to uncertain situations and this differential emotional reaction results in differences in risk taking. Men are also more confident than women and, as a result, may have a different perception of the probability distribution underlying a given risk. Men also tend to view risky situations as challenges, as opposed to threats, which leads to increased risk tolerance. They also show evidence that these differences are narrowed down by experience and profession. For example, studies with managers and entrepreneurs find no gender differences in risk preferences. With regards to social preferences, or other regarding preferences many of the results are contradictory. In some experiments, women are more altruistic, inequality averse, reciprocal, and cooperative than men, and in others they are less so. Croson and Gneezy (2009) suggest the source of these conflicting results may be because women are more sensitive to cues in the experimental context than are men. Finally on attitude towards competitive behaviour they conclude that women are more averse to competition than men and argue that along with nature, societal structure is also crucially linked to the observed gender differences in competitiveness. In this paper I test if men and women react differently to the prime, and find that both men and women are sensitive to the prime and there is no significant difference in how they

act on this information.

A seminal paper on gender differences in competitive behaviour is by Gneezy et al. (2003) where they find that women are less effective than men in competitive environments. The study involves changing the level of competitiveness in a laboratory experiment, from a piece rate to a tournament environment. The authors find a significant increase in performance for men, but not for women. This results in a significant gender gap in performance in tournaments, while there is no gap when participants are paid according to piece rate. One possible explanation for this is that a man and a woman of equal ability have different expectations about their relative ability within the set of their competitors so they behave differently. Another interesting result in this paper is that this effect (difference in performance) is stronger when women have to compete against men than in single-sex competitive environments. This implies that expectations play a crucial role not only in how we perceive others, but also how we perceive ourselves, and this understanding or perception seems to be context dependent.

A very relevant paper is by Sutter et al. (2009) who conduct an experimental study to examine the importance of gender pairing for bargaining behaviour. They use the power-to-take game, which is essentially a two person bargaining game that relates to a typical principle-agent relationship. The analysis involves looking at the four possible combinations of gender in this two-person bargaining game. They find that gender *per se* has no significant effect on behaviour, but that gender pairing has a strong influence. In particular, they observe much more competition and retaliation when the bargaining partners have the same gender than when they have the opposite gender. In this paper I also find gender pairing has a very significant effect. In a similar paper Solnick (2001) uses an UG to examine gender differences in bargaining behaviour. In the treatment sessions the gender of the partner is revealed, whereas, anonymity is maintained in the control settings. The author finds that men and women both make lower offers to women. As responders, both

men and women choose higher MAO when the proposer is female. She explains this may be because people believe that women will accept a smaller amount than men will. The findings in this paper are consistent with Solnick's view in that female proposers attract higher MAO compared to a male proposer.

A different approach in explaining gender differences is that differences in norms tied to gender roles help explain behavioural differences in economic outcomes. Marchetti et al. (2011) examines the impact of information about the proposer on the responders decision in a 2 person UG. The study varies the information for different treatments with either no information, physical description or psychological description. Their results show that acceptance rates are significantly influenced by both fairness of offers as well as the type of description. It seems that the description provided of the proposer as being either selfish or generous generate a framing effect- that the description of a partner as selfish has raised the bar for the norm of fairness from this partner, suggesting that an offer has to be even more fair to be recognized as such by the responder. These results support the relevance of the expectation effects due to the framing in social decision making.

Kray and Thompson (2004) explains the theoretical idea *negotiating partner based gender differences* which posits that men and women do not differ fundamentally, but rather their negotiating partners hold different expectations about men and women that lead them to be treated differently, which in turn affects processes and outcomes. In short, men and women behave differently during bargaining as a result of the behaviour of their opponent. This paper uses similar methods of assessment, where specific expectations attached to gender roles are generated by priming the subjects.

### **1.2.1 Bangladesh: some empirical evidence**

It is often conjectured in the literature that a lot of the gender difference is culture driven, meaning there is more pronounced gender difference in developing countries

than in developed countries. The rationale behind is that differences in gender role identity are more pronounced in developing world, owing to a wider gender gap. It is my submission that Bangladesh presents an interesting case study. On one hand World Bank (WB) reports indicate Bangladesh to be a model country as per social indicators. Even though it is a predominantly Muslim country and in spite of the patriarchal nature of the society, female participation in the work force is high compared to other Muslim or developing countries and the trajectory is upwards indicating that a greater number of women will eventually be in paid employment. Thanks to the micro credit revolution, a higher number of women are working from home growing vegetables or engaging in farm activities. The garments sector, which is by far the highest source of foreign currency earnings, is largely reliant on the female work force. Ratio of girls in secondary school is higher than boys and the percentage of girls passing secondary school examination with higher merit has already surpassed boys indicative of future employability. Bangladesh is also one of the only developing countries to feature a woman as current Prime minister, the leader of the opposition party and speaker of the parliament.

While the number of female managers is on the rise, it is not on an equal level. Also, there still exists very strong perceptions of gender roles. The World Values Survey (WVS) collects survey data to capture changing values and their impact on social and political life around the world. Table 1.1 presents the data from the WVS for Bangladesh (2002) on two questions based on gender perception. The questions are: “*When jobs are scarce, men should have more right to a job than women*” and “*On the whole, men make better political leaders than women do*”. Survey respondents answer to either agree or disagree to the above statements. Remarkably, more than majority of men and women believe men make better leaders and that they deserve more priority when jobs are scarce. This suggests a strong built preference for some roles to be filled by men compared to women. For comparison the data from the 2005 wave in UK is also shown. A reason why the percentages are so high

could be because the data is quite old and does not take in to account the current mind set of people. The latest data wave from Bangladesh has not been published yet. Also the survey data sample consists of the entire population from Bangladesh, including rural areas where the gender perceptions maybe more biased. Finally relevant for this study, the above questions do not reveal perceptions for bargaining behaviour, which is the focal point for this study. This strengthens the need to conduct an experiment in Bangladesh to provide evidence about gender differences in bargaining behaviour.

This main contribution of this paper is two-fold. It gives an alternate explanation to the observed gender differences and explains it by using the idea of social role theory. Secondly, it adds to the very limited literature on developing world, since majority of lab experiments are conducted in the developed countries. Also, it allows for replication, similar studies to be conducted in Bangladesh in the future.

## **1.3 Experimental Design**

In this study I use an UG game to examine bargaining behaviour and norm expectations are generated by the use of priming. The details of each part is given below.

### **1.3.1 The Game**

I use a simple two person UG to examine bargaining behaviour. The game tree is shown in figure 1.1. In this game the proposer has the option to send any amount between 0 to 500 Bangladeshi Taka (BDT) to the second player, who can either accept it or reject it. Participants play with real money where BDT 500 is approximately equal to GBP 5. This is a substantial amount as the maximum wage a student can earn in an hour is less than BDT 300. I use a simultaneous method, where the responder (player 2) states a Minimum Acceptable Offer (MAO) instead

of responding to a specific amount. If the responder's MAO is less than or equal to the proposer's offer, both get the amount proposed by the proposer; if MAO is more than the offer, both get zero.

### 1.3.2 The Treatment

I use a simple treatment to see the effect of *role expectations* on behaviour. The subjects in the treatment sessions read the following 150 words paragraph to make gender difference salient.

*Decades of research in experimental economics has shown that preferences of individuals and their economic behaviour are quite heterogeneous. The literature has attempted to explain this heterogeneity due to different factors such as age, educational background, cultural differences, income levels and social status, among others. One of the most important factors that has been analyzed thoroughly is the role of gender in economic behaviour. Recent surveys which review the literature on gender differences in experimental economics have found that, women tend to be more generous and demonstrate a fairer approach towards distribution of wealth when compared to men of similar background. For example, authors Guth, Schimdt and Sutter (2007) find that female participants are significantly more likely to offer equal splits of a pie or sum of money than are men, and suggest this is because women are averse to the idea of inequality.*

In the control sessions there was no prime. A neutral paragraph was not used, as the main purpose was to see the effect of the above paragraph on the subject's decision. It is possible that a neutral paragraph may have generated some other bias that the experimenter could not control. As no subject participated in both control and treatment sessions, it was expected that there would not be any possibility of contamination. As a placebo, subjects were made to wait for 60 seconds before proceeding to play the game. It is estimated that on average people can read 3 words per second, which would mean it would take a subject on average 50 seconds

to read a 150 word paragraph, which is the length of the paragraph that subjects read in the treatment sessions.

### **1.3.3 Questionnaire**

After completion of the UG game, subjects solved the Raven Progressive Matrices (RPM) test which included 30 visual puzzles (Raven et al., 2003). Participants were allowed 30 seconds for each puzzle to be completed, as it is pretty standard in the literature. As a non-monetary incentive, subjects were told they will receive their scores from the raven at the end of the experiment. After completion of the tasks the participants were asked to fill out a simple questionnaire. The form included questions on personal information such as their age, current degree course, current semester of study, medium of instruction in high school(english or bengali), exam mode (S.S.C/ H.S.C or GCSEs) familiarity with other participants in the lab, relationship status and life satisfaction. A 30-item DOSPERT questionnaire was asked to elicit risk preferences of participants following (Blais and Weber, 2006). The DOSPERT questionnaire has 6 questions from 5 different risk domains: financial, ethical, social, recreational and health and safety. The 44 item inventory that measures an individual on the Big Five Factors of personality is also used to elicit personality measures (John and Srivastava, 1999).

### **1.3.4 Implementation**

The study was conducted in a private university in Bangladesh. The students were recruited using university notice boards and email invitations. Appendix A shows a sample poster used for recruitment. A contact information was given in the advertisement and interested participants were asked to either email the experimenter or sign in using an online google form. The experimenter then confirmed participation and subjects were notified via email/ text about their participation date and time. This process was followed to ensure equal participation of men and women



in the study, but the subjects were not informed about this. All of the subjects are from Bangladesh and the names are very gender specific, so it was possible to infer the gender of the participant from their name. A full list of experiment dates is available in the appendix B. Each session was designed so that the number of participants did not exceed 20. A computer laboratory in the university was booked for the experiment dates and converted to be a suitable experimental lab. A picture of one of the sessions is available in the appendix C. Once the students came to the lab they were randomly assigned an id number attached to a single computer. The experiment was conducted using the software z-tree Fischbacher (2007). In total 222 students participated over 12 sessions, each session lasted about an hour. There were 108 subjects in control sessions and 114 subjects in treatment sessions. On average each participant earned BDT 415 (approx GBP 4), with a show up fee of BDT 250. This is a substantial amount as the student can earn up to BDT 300 for an hour as a Teaching assistant at the university. The sequence was the same in both conditions, only difference was that participants in the treatment condition were asked to read the paragraph.

## 1.4 Results and Discussions

In this section, I will present the results of this study. I will refer to the sessions without any priming as control sessions and the sessions with the prime (paragraph) will be called treatment sessions. In all sessions gender about the other person was revealed in a simple sentence which said ” *You have been assigned the role of Proposer (Responder), you are partnered with a Male (Female) Responder (Proposer)*. I begin with table 1.2 which shows differences in mean for major variables across the treatment. For all differences independent-samples t-test was conducted to compare the characteristics in the control sessions and the treatment session. The differences are not significant so we can say the sample in the control and treatment sessions

were not significantly different across major individual characteristics.<sup>5</sup> The average age in the sample was about 20 years. There is a slight difference in the raven score, where subjects in the treatment sessions have on average 1.306 points more than subjects in control sessions. I carried independent tests on raven score to see if it affects the offers made in the UG, but there was no effect. There is no reason to think that subjects in the control session will systematically have higher raven score, this is a small difference which I suspect is due to randomisation. The two groups are similar in terms of personality traits and risk preferences. On average profits from the UG game was about BDT 171. Appendix E shows the histogram of offers made by Proposers and minimum acceptable offers made by Responders. As expected, the distributions are almost bell shaped, with some peaks at the edges and the highest peaks at the median.

#### 1.4.1 Proposer Behaviour

First we look at the effect of treatment on proposer behaviour. An independent-samples t-test was conducted to compare proposer offers in control and treatment conditions. There was no significant difference in the offers for control ( $M=265.81$ ,  $sd=84.51$ ) and treatment ( $M=253.47$ ,  $sd=116.74$ ) conditions,  $p = 0.5268$ .<sup>6</sup> These results suggest that the prime does not have an effect on proposer behaviour.

I further split the samples according to subject's own gender and gender of partner. Independent samples t-test reveals no significant difference. Overall offer amounts are lower in the treatment sessions, but this difference is not significant. There is a larger difference in offers made by women compared to offers made by men, between control and treatment sessions. This result is consistent with previous findings in Croson and Gneezy (2009), who show that women are more sensitive to difference in contextual cues compared to men. I present the results in figure

---

<sup>5</sup>All tests were replicated using Mann-Whitney U test and the results were consistent with the findings of ttest

<sup>6</sup>The results obtained from Mann-Whitney U test are similar,  $p\text{-value}=0.587$

1.2, which splits the sample by the proposer's own gender. There is no difference between offers made by male subjects in the two treatments, for females the difference is 28.7 BDT (p-value 0.3000) The bars show errors at 95% confidence interval. Figure 1.3 shows the results split by the partner's gender. Here we can see highest offers are made to male partners (responders) in the control session (M=275.88). Female responders attract lower offers in control (M=255.74) and treatment sessions (259.32), and this is similar to offers made to male responders in the treatment condition (M=250.24). Although the differences are not significant, an interesting pattern seems to emerge. If we look at the behaviour in the control condition, there is a larger gap between offers made to men and women, where men attract higher offer (difference of approx 20 BDT). However, this difference comes down to only 9 BDT and the direction is reversed in the treatment condition. Women attract higher offer. The prime seem to generate expectations of gender equality.

Finally in figure 1.4 I show the average proposer offer according to four possible gender pairing: MM MF FM and FF. The first letter corresponds to the gender of the proposer and the second letter shows the gender of the responder. The average offers are higher for mixed genders (MF and FM). The offers are lowest for all female pairs. The pattern is consistent with the literature that shows men attract higher offers (Solnick, 2001) and members of one's own sex are the primary competitors, so they offer least (Sutter et al., 2009).

#### 1.4.2 Responder Behaviour

I will carry out similar analysis for the responder MAO. This is also a continuous variable between 0 to 500 BDT. The independent-samples t-test was conducted to compare MAO under control and treatment conditions. There is a significant difference in the responder MAO for control (M=267.3704, SD=131.4741) and treatment (M=227.2456, SD=118.8116) conditions;  $p = 0.0471$ . These results suggest that the prime really does have an effect on responder MAO. Specifically, the results suggest

that when individuals are primed, responder MAO falls significantly. So, responders lower their expectations and as such lower their asking MAO. To understand what expectations within the treatment is driving the results I split the sample according to the responder gender and their partner (proposer's) gender. Overall across all four categories MAO is lower in treatment condition compared to control condition. Both male and female responders update their expectations and reduce their MAO after the prime. There is no gender difference in responder MAO. However, further examination reveals that the fall in MAO in the treatment session is driven by one crucial factor, the gender of the partner. If the partner (proposer) is male, then the responder MAO is significantly lower. The difference is quite substantial (54.95 BDT) and is significant at 5%.

Figure 1.5 shows the average offers made by both males and females is lower in the treatment condition. In figure 1.6 when we split the sample by partner's gender, two important facts are revealed. The MAO is significantly different and lower for male partners (proposers) compared to control condition, and also there is a significant difference between offers made to the female and male partners within the treatment condition. This is very interesting as it suggests there is a very clear and singular direction in which the prime acts. This difference cannot be explained by any other factor. The only thing driving the result is the prime.

Figure 1.7 shows average responder MAO according to four possible gender pairing: MM MF FM and FF. The first letter corresponds to the gender of the responder and the second letter shows the gender of the proposer (note the gender notation is opposite to what was shown in figure 1.4). The most obvious result is that both men and women ask for a significant lower MAO when the proposer is male. The other offers are somewhat similar. In the next section I look in to the results to better understand the causality of this effect.

## Regression Analysis

I use a simple regression analysis to show the causal effect of the treatment on responder MAO. In table 1.5 model 1, the effect of treatment variable is shown on the MAO, controlling for individual characteristics such as risk aversion, raven score, big 5 personality factors and their medium of schooling. In model 1, the significant effect is the treatment, which has a negative effect on the responder MAO. This means the treatment condition makes individuals ask for a lower MAO. In model 2, when the variable female is added, the treatment variable is still significant. The sign of variable female is negative which indicates female responders ask for lower MAO compared to male responders but this difference is not significant. In column 3, I add the variable partner's gender which is equal to 1 if the partner is female. This effect is positive and significant. So compared to male partners, female partners attract higher MAO. In model 4, I add the interaction terms treatment with gender and treatment with partner's gender. The sign of the effects are still consistent but the significance is lost. This is possibly due to loss in power in the model or the effects cancel each other as they are going in opposite direction. The main result is that the only significant effect is that of the prime, there is no gender difference otherwise. There is also no difference in how men and women react to the prime, both genders update the expectations and ask for a lower MAO from the male partners. The prime seems to generate the expectations that men are more selfish compared to women and so the asking MAO is significantly lower for men.

A brief summary of results: Firstly I find no significant gender difference in the offers made, either by proposer or responder. This may be surprising as one would expect there to be gender differences in preferences in a developing country like Bangladesh. One possible explanation could be that the subjects in the study are all young, undergraduate students. Regardless of their socio-economic background they are all part of a community which encourages equal participation by men and women. They have been exposed to higher education and are not rep-

representative of the general population, who is perceived to be more gender biased. Another possibility is that I find no gender differences due to cultural norm. Maybe the general population is more generous overall, and there is no expectation that women are or should be more generous. It is only when the specific expectation about bargaining behaviour is generated, I find some difference. Moreover, I find no difference in the way the prime affects men and women. It is not the case that women are more susceptible to the prime than men are as suggested by Croson and Gneezy (2009). This could be an issue of self selection by the women in the study. A possible solution would be to check if the beliefs formed are different for men and women, but this is a limitation of the study as I do not elicit belief. Finally, the results suggest that the prime is the only element driving the difference in responder MAO, so this is a clear treatment effect. The crucial part in the paragraph said *"women tend to be more generous and demonstrate a fairer approach towards distribution of wealth when compared to men of similar background. For example, authors Guth, Schimdt and Sutter (2007) find that female participants are significantly more likely to offer equal splits of a pie or sum of money than are men, and suggest this is because women are averse to the idea of inequality."* Although the prime contains information about women's behaviour, the direction of the effect seems to work towards men, subjects lower their MAO towards men in anticipation that men are not as generous as women.

## 1.5 Conclusions

In this paper I use an UG to test gender differences in bargaining behaviour. I use the method of *priming* to generate gender specific expectations. Participants read a paragraph about gender differences in behaviour, the expectation is reading this would make their gender identity salient and also generate certain gender specific expectations, such as women are more generous than men in bargaining scenarios.

The main result suggests that the prime changes behaviour of both men and women in the responder role where both genders ask for a lower MAO when they are partnered with a male, after controlling for personality traits, intelligence and risk preferences. There is no difference in how men and women react to the prime. Also, I find no significant difference in proposer behaviour, consistent with existing literature.

The main contribution of this paper is that it is the first lab experiment in Bangladesh to be done with students. This adds to the current almost non-existent literature on the psyche of the youth, that too of such a young population country like Bangladesh. This paper opens up the possibility of replication in similar universities in Bangladesh and other developing countries. This paper also adds to the current literature on gender differences in bargaining behaviours, which is mostly comprised of studies done in developed countries.

There are a few limitations of this paper. It would be interesting to use a different method to generate gender norm expectations, instead of asking participants to read a paragraph. A criticism can be that this generates demand effects, where the subjects only show difference because they suspect what the experimenter expects to see. I cannot completely rule out the possibility of some demand effect, but by that same logic I should also see difference in proposer behaviour, which does not seem to happen in this case. Also, it would be interesting to get information on individual's belief, that would allow to shed some light on how the prime works. It would also be interesting to do a similar study in a developed country like UK, to see if the results are consistent.

This paper can have huge policy implications. The main argument here is that fundamentally men and women are not different but they behave differently due to the expectations that society puts on them. If this is true, then the policies targeting gender equality has to focus more on setting unbiased expectations on gender roles. For example, women empowerment cannot fully be achieved by

only targeting one gender. Merely asking women to get financially independent and securing equal opportunity for jobs is only half the picture. Such a system still puts the onus of household chores on women. While girls are asked to help in the kitchen or set up table for dinner, boys are more likely to help out with outward activities. Ideally policies should be designed to reduce the existing gender role identification and stereotypes. Maybe men should be encouraged to be more involved with household activities and raising a family. If gender differences are driven by perceptions and expectations about each gender, an obvious first step is to address such biases in expectations to ensure gender equality.



Table 1.1: Gender perceptions based on WVS

Item	Bangladesh	(2002)	UK	(2005)
	Male	Female	Male	Female
Job Scarce	75.8%	56.3%	17.8%	14.0%
Political Leader	66.3%	63.5%	23.3%	12.7%

Figure 1.1: The game tree

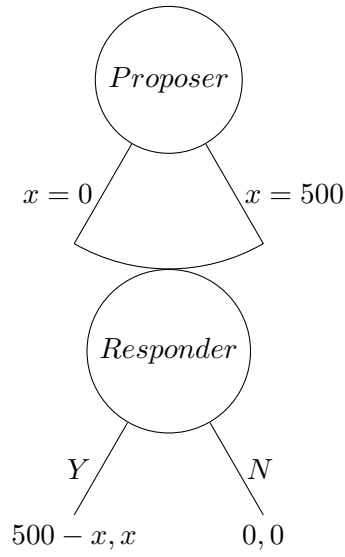


Table 1.2: Differences in mean across treatments

Variable	Control	Treatment	Differences	Std. dev	N
Age	20.79	21	-0.203	1.28	222
Raven	10.33	11.7	-1.368*	4.79	222
Extraversion	3.29	3.29	.003	.71	222
Agreeableness	3.86	3.86	-.002	.47	222
Conscientiousness	3.47	3.46	.015	.609	222
Neuroticism	3.02	3.01	.009	.768	222
Openness	3.73	3.81	-.074	.442	222
Risk aversion	.57	.56	.003	.096	222
Profit	166.67	175.43	-8.77	141.93	222

Table 1.3: Differences in mean proposer offer

Variable	Control	Treatment	Differences	Std. dev	N
Proposer Offer	265.81	253.47	12.34	102.06	111
Male	269.27	266.14	3.12	103.97	56
Female	263.43	234.73	28.69	100.39	55
Male Partner	275.88	250.24	25.64	102.02	64
Female Partner	255.74	259.31	-3.71	103.18	47

Figure 1.2: The average Proposer offer, split by gender

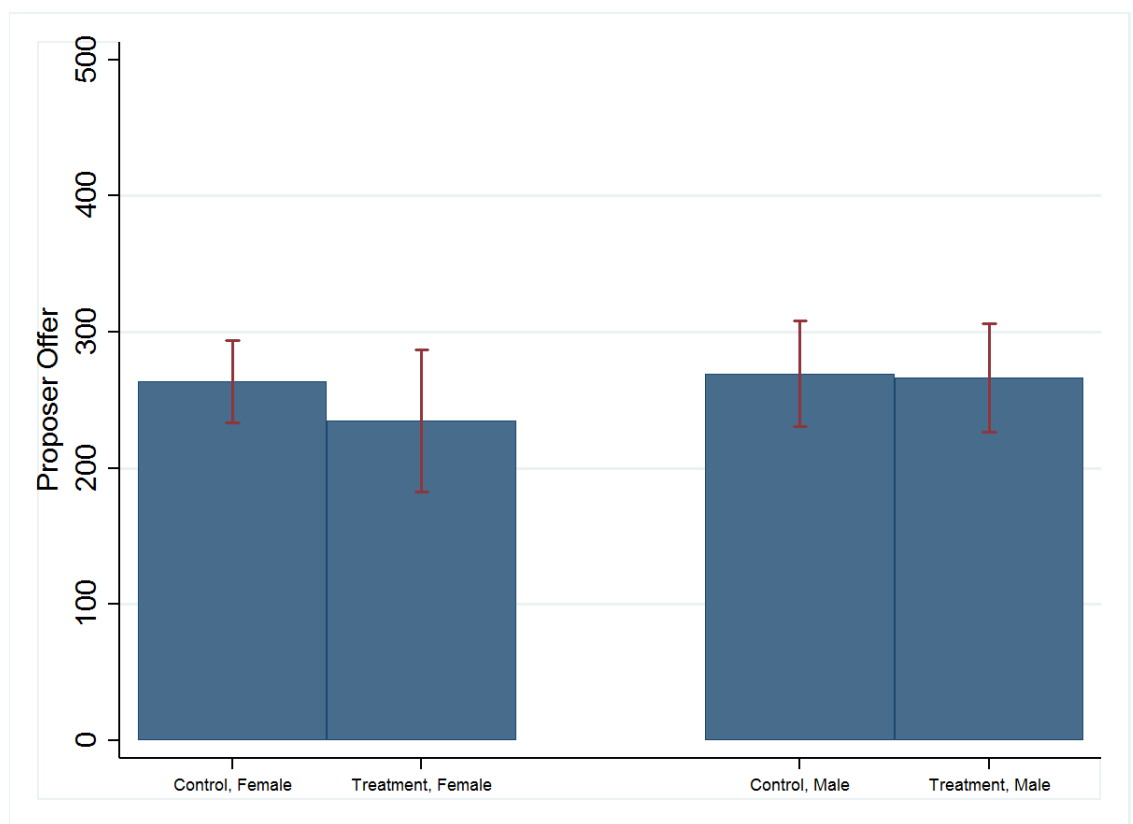


Figure 1.3: The average Proposer offer, split by partner's gender

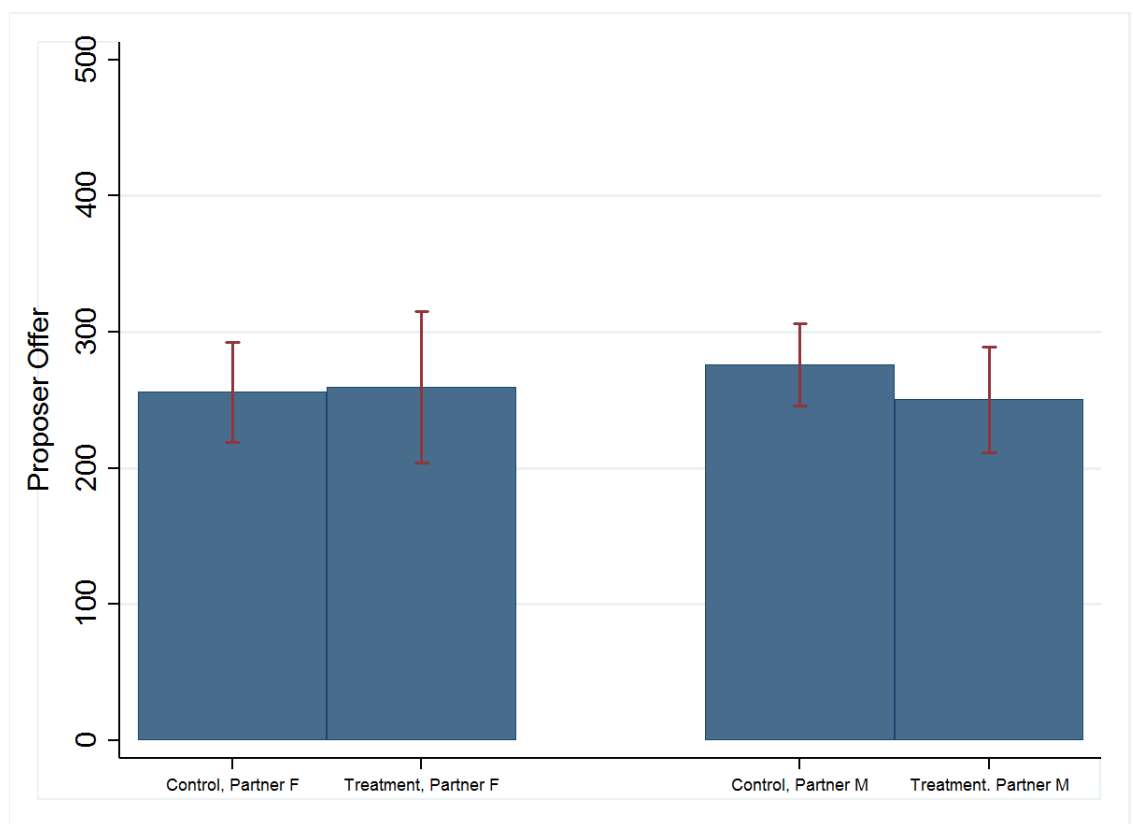


Figure 1.4: The average Proposer offer, split by gender pairs

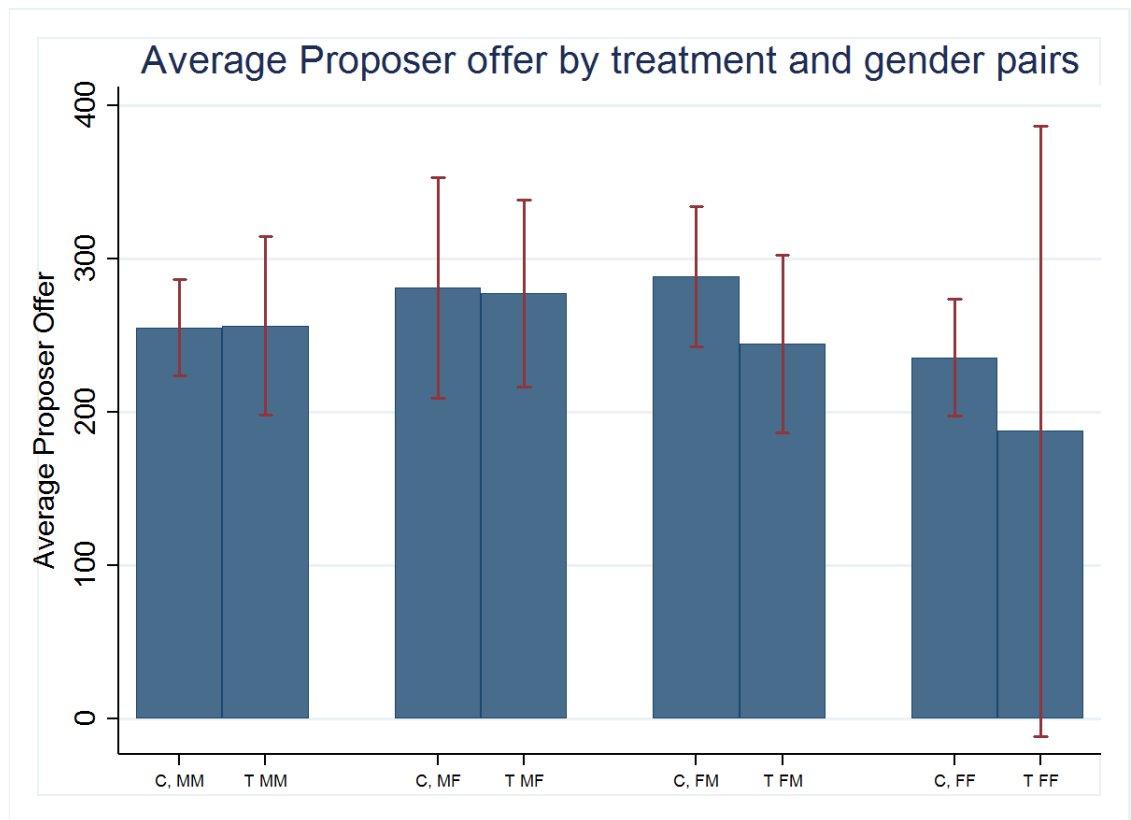


Table 1.4: Differences in mean responder MAO

Variable	Control	Treatment	Differences	Std. dev	N
Responder MAO	267.37	227.24	40.12**	126.17	111
Male	266.34	223.78	42.56	125.11	55
Female	268.86	229.58	39.27	128.31	56
Male Partner	261.62	206.67	54.95**	126.62	64
Female Partner	273.11	265.3	7.81	123.17	47

Figure 1.5: The average Responder MAO, split by gender

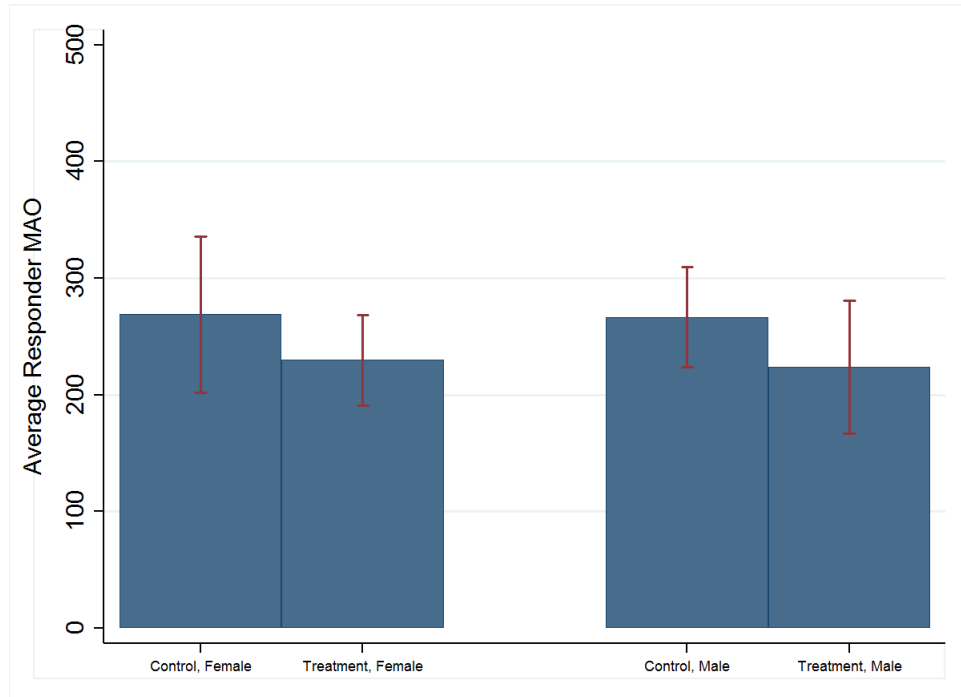


Figure 1.6: The average Responder MAO, split by partner's gender

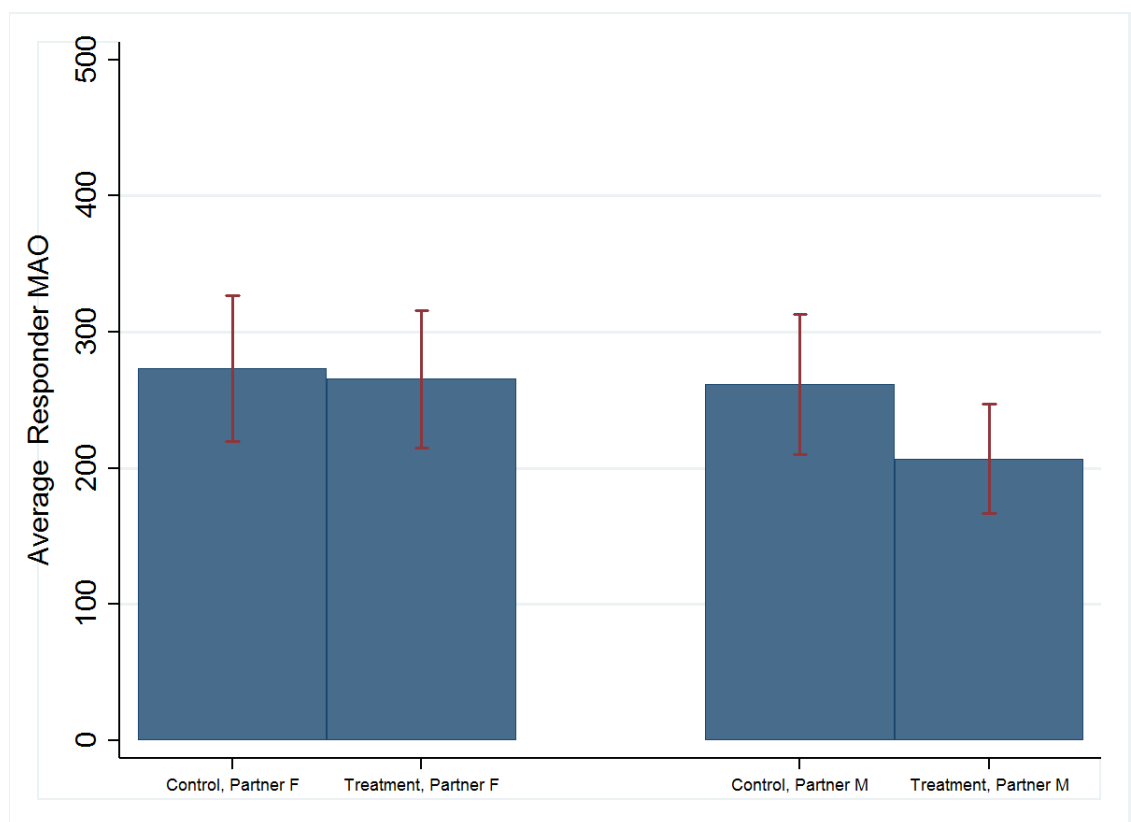


Figure 1.7: The average Responder MAO, split by gender pairs

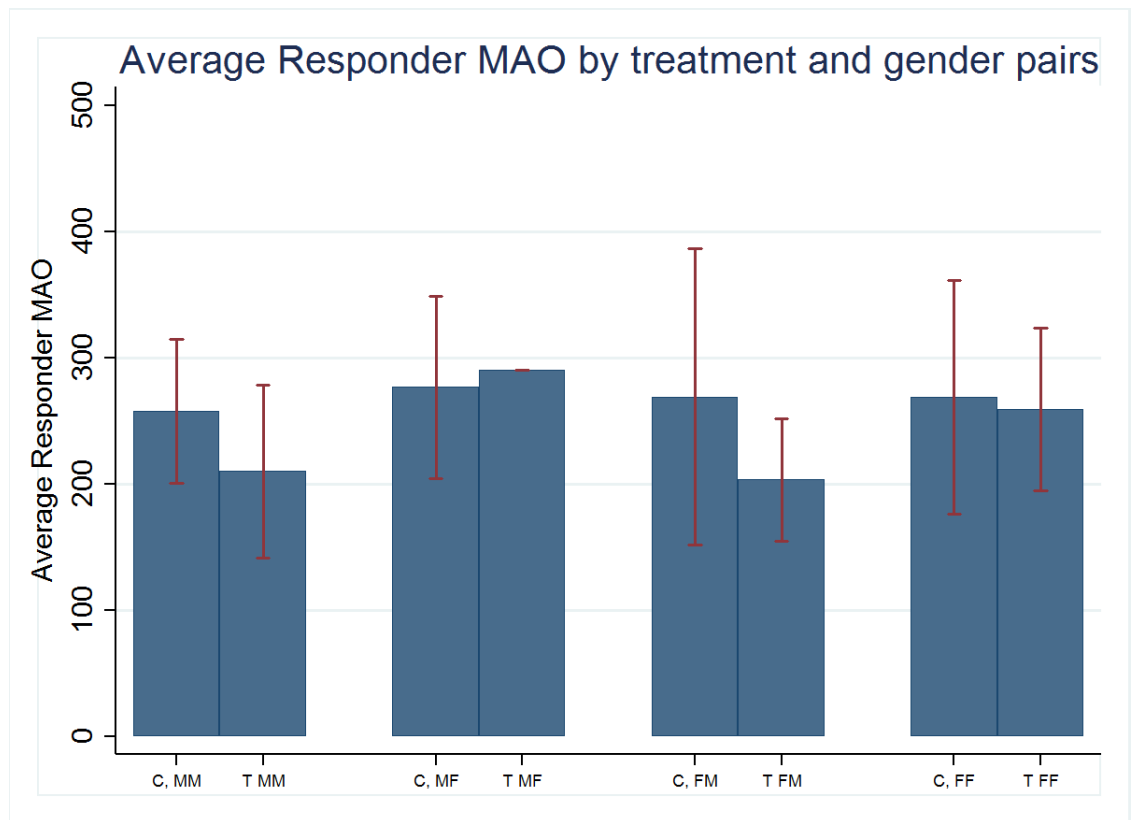




Table 1.5: Regression estimation for responder MAO

Dependent variable is log of responder MAO. Standard Errors are clustered at the session levels; \*  $p - value < 0.1$ , \*\*  $p - value < 0.05$ , \*\*\*  $p - value < 0.01$

	MAO Model 1 b/se	MAO Model 2 b/se	MAO Model 3 b/se	MAO Model 4 b/se
Treatment	-0.27155*	-0.26129*	-0.19822	-0.21190
	(0.1483)	(0.1550)	(0.1538)	(0.2363)
Female		-0.04072	-0.10898	-0.08562
		(0.1693)	(0.1679)	(0.2266)
Female Partner			0.36804**	0.31446
			(0.1543)	(0.2153)
Treatment x Female				-0.06390
				(0.3055)
Treatment x Female Partner				0.11700
				(0.3061)
Risk Aversion	-0.10323	-0.08435	-0.28810	-0.29302
	(0.8595)	(0.8671)	(0.8516)	(0.8604)
Raven	0.05692	0.03006	0.11941	0.11273
	(0.3453)	(0.3645)	(0.3581)	(0.3627)
Openness	0.49053	0.52128	0.48239	0.49291
	(0.4845)	(0.5033)	(0.4920)	(0.4979)
Conscientiousness	-0.26740	-0.25714	-0.36074	-0.34330
	(0.3712)	(0.3754)	(0.3694)	(0.3755)
Extraversion	0.48288	0.48403	0.42708	0.40789
	(0.4354)	(0.4375)	(0.4281)	(0.4402)
Agreeableness	-0.11866	-0.11252	0.10780	0.11908
	(0.5785)	(0.5818)	(0.5760)	(0.5852)
Neuroticism	0.28515	0.31214	0.34500	0.34956
	(0.3975)	(0.4149)	(0.4056)	(0.4116)
English School	0.13836	0.15212	0.21627	0.21597
	(0.1806)	(0.1902)	(0.1878)	(0.1896)
N	110	110	110	110

## Chapter 2

# Cooperation and Positive Mood in Repeated Interactions

### 2.1 Introduction

The vast majority of exercises we, as social beings, engage in requires assistance, help, collaboration; in other words some form of cooperation. The paramount importance of cooperation, its determinants and its applications have warranted a plethora of academic literature, especially in the field of economics. Game theory has proven to be a significant tool for both normative and descriptive research on collective action problems, especially on the importance of cooperation. One of the most common tools used for measuring cooperation is the Prisoner's Dilemma (PD) game, which is essentially a two-person game which represents conflict between individual and collective interests. Embrey et al. (2015) and Dal Bó and Fréchette (2014) provide excellent surveys on determinants of cooperation in finitely repeated and infinitely repeated PD games, respectively. The evidence from field and lab shows a lot of heterogeneity in the results, even after controlling for experience in the repeated games, indicating that perhaps the heterogeneity in behaviour is due to differences in individual characteristics. Notable examples include, Croson and

Gneezy (2009); Davis et al. (2016) who explore the relation between gender and cooperation; Sabater-Grande and Georgantzis (2002) investigate differences in individual risk preference and Dal Bó (2005) investigates subject's choice of degree. In a recent paper Proto et al. (2014) have shown cooperation to be related to individual differences in intelligence.

One possible source of heterogeneity may be differences in mood or feeling states of subjects, implying that humans often make different decisions depending on their current feeling state. In the last 40 years, the management literature has largely emphasized the importance of an organizational model integrating employees' affect, something that has been defined "affective revolution" (see e.g. Barsade and Donald E. Gibson 2007). This notion is more generally reflected in the work of psychologists and neuroscientists (e.g. Damasio (1994); Ralph and Damasio (2000); Forgas (2002); Fischer et al. (2008)), who have provided a wealth of evidence that mood and, more generally, emotions are an essential and adaptive component of social behaviour.<sup>1</sup> A central question in the management literature is the specific effect of good mood on performances, several contribution have emphasized how individuals with more disposition to positive mood are also better performers in different tasks.

Recently Oswald et al. (2015) show that experimentally inducing positive mood seems to invigorate individuals leading them to exert more effort in individual tasks. The direct implication is that happiness is good for worker productivity and in turn good for firms' profits. However, many workplace tasks are not of the individual one-shot decision-making variety but instead are likely to involve repetition, social behaviour (including strategic interaction) and a degree of cooperation. Accordingly, the question we address in this paper is the effect of positive mood ("happiness") on cooperation under repeated interactions, which allows us to contribute to this growing debate on the effect of well-being on economic performance (productivity)

---

<sup>1</sup>Moods are emotional states, unlike emotions; they are relatively low-intensity, diffuse, and enduring affective states that have no salient cause and little cognitive content (e.g., feeling good or feeling bad, being in a happy or sad mood) (Forgas, 2002).

in the workplace.

The repeated Prisoners' Dilemma provides perhaps the most well-known game that captures a fundamental tension in social interactions: the conflict between short-term losses and long term benefit of cooperation. It is not surprising then that the Prisoner's Dilemma is one of the most highly studied games in the laboratory. However, laboratory-based evidence has emphasized that conventional theory does not offer clear guidance, neither in finite setting – where cooperation occurs despite backwards induction predicting otherwise (see Flood (1952) for the seminal paper and Embrey et al. (2014) for a survey of the subsequent literature); nor in an infinite repetition game – where neither subgame perfection nor risk dominance provide a sufficient condition for cooperation (Dal Bó and Fréchette (2011) and Dal Bó and Fréchette (2014) for a survey of the literature). Therefore, what determines cooperation in the repeated Prisoners' Dilemma is still, to a large extent, an unsolved puzzle.

According to the existing literature, the effect of positive mood on cooperation seems to be rather complex. On one hand, empirical research suggests that people experiencing positive mood are more assertive and inward oriented, use less information and more stereotypes, and avoid demanding, systematic thinking (e.g. Schwarz (2013) and Forgas (1998)). Proto et al. (2014) show that cognitive skills heavily positively affect cooperation in the repeated Prisoners' Dilemma. Putting this all together we might hypothesize that positive emotion reduces systematic thinking which in turn might reduce cooperation. We refer to this mechanism as the “cognitive channel”.

In contrast, classic studies in psychology have shown that positive mood produces more open, altruistic and helpful behavior (e.g. Isen and Geva (1987)). These latter are consistent with the more recent experimental economics studies investigating the effect of emotion in *one-shot* economic decisions that emphasize the impact of emotion on social preferences, in the sense that individuals are more altruistic

and trusting (Kirchsteiger et al., 2006; Capra, 2004; Drouvelis and Grosskopf, 2016; Dunn and Schweitzer, 2005; Kessler et al., 2016).<sup>2</sup> This leaves the question of how mood should affect cooperation very much open. We refer to this mechanism as the “social preferences channel”.

In this paper, we investigate the impact of induced mood on cooperative behaviour. In our set-up, participants play different variants of the repeated PD. The key treatment is whether participants face a positive or neutral mood induction process;<sup>3</sup>. We replicate this key treatment under different conditions: (a) whether participants are allowed to communicate by sending short text statements prior to interaction; (b) whether participants play in a repeated Prisoner’s Dilemma with a known end round (finite repetition) or whether this is indefinite (typically abbreviated to “infinite repetition” in the literature)

Our main finding suggest that the effect of induced positive mood is generally negative, in the sense that subjects in the positive mood treatment cooperate less and play less efficiently than subjects in the neutral mood. In the finitely repeated treatment and in the treatment with communication, the effect of positive mood is smaller and in the sessions with both communication and finitely repeated interactions the effect disappears. This suggests that positive mood has a stronger negative effect, the less information is available to player. Hence, arguably the effect is stronger, the more complex the game. This interpretation of the data is corroborated by an analysis of the text used in the communication setting where individuals in the good mood treatment seem to be more inward-oriented than individuals in the neutral mood treatments. This first result is clearly more consistent with the cognitive channel than with the social preferences channel. In other words, these results clearly show that under repeated interactions, the results that individuals

---

<sup>2</sup>Other related contributions are Guiso et al. (2013); Lerner and Keltner (2001) on mood and risk preferences; and Ifcher and Zarghamee (2014); Pyone and Isen (2011); Drichoutis and Nayga (2013) on mood and time preferences.

<sup>3</sup>We describe this in detail later, but we note here that we used a combination of the well-known “Velten mood induction process” and a music-based mood induction: see (Westermann et al., 1996).

are more pro-social when in a good mood is dramatically reversed.

In order to gain more insights on the way the “cognitive channel” works, we present a model where we measure subjects’ beliefs about partners’ choices before they play the repeated prisoners’ dilemma. In this simple model, agents have some given beliefs about their opponent’s strategies and chose their optimal strategies by maximising their surpluses on the basis of these beliefs. We show that the difference is driven by more accurate beliefs about partners’ choices and by choices that are more consistent with a maximizing behaviour among participants in the neutral mood treatments. There exists related work which has emphasized the strong effect of intelligence in influencing strategic interaction (e.g. Gill and Prowse (2016), Proto et al. (2014)) and the weak effect, especially in the long run, of other characteristics (see Dal Bó and Fréchette (2014) for an extensive survey). Our results are related to this literature because they show that positive mood seems to negatively affect individuals’ theory of mind and capacity to optimize, elements that are clearly linked to cognitive skills. This is consistent with Hertel et al. (2000) suggesting that mood affects the process of decision making in cooperative situations (rather than affecting the level of cooperation), in particular they argue that under positive mood there is more heuristic processing, whereas negative mood leads to more systematic processing. More generally, our results lend some support to the notion that emotions, at least in some instances, can lead to suboptimal decisions (e.g. Baumeister et al. (2007), Frijda and Mesquita (1994)).<sup>4</sup>

The following section details our experimental design including an examination of the mood induction process and the various treatment differences. Section

---

<sup>4</sup>It is important to note the deviation of this discussion from traditional *rational* or *irrational* behaviour in economics. According to Frank (1988), emotions act as a commitment device. As one of the examiners commented *For instance, the emotion of anger may be detrimental in one-shot interactions if it leads to actions that are destructive of material resources (e.g. punishing some offenders), but may be beneficial in the longer term if they become associated with a certain reputation (e.g. the subject is not attacked because of his/reputation of vengeance)*. In other words, the same behaviour may be seen as irrational in the short term but rational in the longer term. We refrain from using the traditional meaning of the words rational or irrational behaviour, and focus our analysis on what we call best responses dynamics and behaviour consistent with one’s beliefs, explained in the later section.

2.3 begins with a presentation of comparative statics across treatments. We then present an examination of the basins of attraction surrounding the different strategies as well as an examination of the accuracy of beliefs across treatments. The section finishes with a text analysis of the content of communication between participants during the relevant sessions. Section 2.5 concludes with a discussion of the findings.

## **2.2 Experimental Design**

The experiment in our study consisted of three parts. In the first part, we implemented a mood induction process through which laboratory participants were induced with either a positive mood or a neutral mood. In the second part, participants played different versions of the repeated Prisoners' Dilemma game. In the final part, students answered a questionnaire which consisted of intelligence, demographic, personality and risk preference questions. The experiment instructions, including the questionnaire, are available in Appendix J. In what follows, we will describe the different treatments, a summary table is available in the appendix F.

### **2.2.1 Mood Induction Procedures**

In our study we use a combination of two different mood induction procedures (or hereafter "MIPs"): the "Velten" MIP and a music-based MIP. Studies have found that a combination of MIPs often have more impact than a single MIP (Västfjäll, 2002). The Velten MIP is the most widely accepted and used form of MIP. In this method subjects read a series of statements describing either positive self evaluations or somatic statements. An example of a statement under the positive setting is: "If your attitude is good, then things are good, and my attitude is good" (Velten, 1968). In the neutral state, participants are presented with trivial and factual statements which carry no emotional load. For example, "The orient express travels

between Paris and Istanbul”. A detailed list of all the statements used in the experiment is available in Appendix N. In our experiment we used the 50 statement version of the Velten MIP following Isen and Gorgoglione (1983). In the music MIP subjects listened to a mood-suggestive piece of classical or modern music. In the positive treatment we used the allegro from Mozart’s *Eine Kleine Nacht Musik* as background music. For the neutral treatment, the music *Aerial Boundaries* from Michael Hedges was used. These music pieces were chosen from a list of publications that have successfully used the music MIP (Västfjäll, 2002). Participants were provided with headphones for this part of the experiment and did not know if the other participants also read or listened to the same items. In our treatments participants read the statements and listened to the music simultaneously. The process lasted for approximately 6 minutes 45 seconds, with 7.5 seconds for reading each statement.

### 2.2.2 The Game

Table A.1 shows the Prisoners’ Dilemma stage game used in our study, following Embrey et al. (2014). The Prisoners’ Dilemma is perhaps the most studied game in experimental economics and the most archetypal example of the cooperative problem in modern economics. The unique Nash equilibrium, which coincides with the unique dominance solvable outcome, is “Defect, Defect” offering a payoff of 39 to each player. Any finite repetition will result in the same unique Nash equilibrium (and dominance solvable outcome) which is a repetition of “Defect, Defect” in every stage of the game through backwards induction from the final stage. An infinite repetition allows a multitude of possible Nash equilibria through a well-known application of the folk theorem (Fudenberg and Tirole, 1991).

We explicitly study two variants of the repeated Prisoners’ Dilemma: a variant with a known end stage (the “finite” repetition treatment) where participants play the game for exactly 11 rounds and this information is known; and a variant



with an unknown end stage (the “infinite” repetition treatment) where participants are told the game will be played for at least 10 rounds. In practice in the laboratory the unknown end stage treatment (unknown only from the perspective of the participants) lasted for 12, 10 and 11 rounds in the three supergames.<sup>5</sup> In total, participants played in only one variant each (either with a known end date or not) playing exactly three times with different partners each time (perfect strangers).

### 2.2.3 Pre-play Communication & Belief Elicitation

In some sessions (which we label the “chat” treatment hereafter) we allow participants the opportunity to engage in pre-play communication. Communication allows participants to send signals about their type, strengthens identity among the group and creates certain norms favouring cooperation (Balliet, 2010). In the “chat” treatments, prior to playing each of the three repeated Prisoners’ Dilemma super-games, participants were allowed to chat for 180 seconds with their partner. In the control sessions, participants were not allowed to chat and waited for 60 seconds before moving on to the next task.

In the sessions which we label “belief”, we elicit each participant’s belief about the likelihood that their partner will choose to cooperate. This was incentivised using a simple quadratic scoring rule. Specifically, the stated likelihood “R” was entered into the following formula, where “r” denotes the realized action of the partner. E is the experimental unit earned from belief elicitation. One randomly chosen E was then multiplied by £2 and added to the participants earning.

$$E = 1 - \left( \frac{R}{100} - \frac{r}{100} \right)^2$$

---

<sup>5</sup>The durations of 12, 10 and 11 in the treatment with an unknown end stage were set to give an average of 11, leaving the average duration the same as in the known end stage treatment. No participant took part in more than one treatment or session and so this relationship would not have been derivable to participants.

#### 2.2.4 Questionnaire

After completion of the Prisoners' Dilemma games, participants were asked to attempt 30 visual puzzles from the Raven Progressive Matrices (RPM) test (Raven et al., 2003). We allowed 30 seconds for each puzzle to be completed. Participants were paid £1 each for three randomly-chosen answers if they proved to be correct. Following the Raven test subjects completed a survey which included demographic questions (see appendix J) for a detailed list). Next, a 30-item DOSPERT questionnaire was used to elicit the risk preferences of participants (Blais and Weber, 2006) and the "BIG Five Inventory" was used to measure the personality traits of subjects following John and Srivastava (1999). Participants were also asked to recall and assess how they felt after listening to the music at the beginning of the session on a 5-point scale from "Not at all Happy" to "Very Happy": such self-reports are usually held to be a valid approach for the measurement of emotions (Robinson and Clore, 2002). A full list of personality questions and risk questions are available in appendix O and appendix P, respectively.

#### 2.2.5 Implementation

Participants were recruited using the SONA online recruitment system at the University of Warwick and the sessions were conducted in a computerised lab equipped to accommodate 20 subjects per session. Most participants were undergraduate and postgraduate students at the university. We excluded economics students as previous studies have found them to behave more strategically in lab experiments (e.g. see Dal Bó (2005)). We also excluded participants with any prior knowledge of game theory. In total, 552 students participated between June 2015 and June 2016 over 32 sessions, with 270 participants in the positive treatment and 282 in the neutral treatment. Each session lasted for about 90 minutes and on average subjects earned £17 including show up fee of £5. The experiment was implemented using Z-tree (Fischbacher, 2007).

## 2.3 Results

The characteristics of the different groups in the different mood inductions is detailed in table 2.2. The table indicates that participants in the positive mood treatment recalled being in a significantly better mood than those in the neutral treatment suggesting that our mood induction was successful. The other characteristics are on average not significantly different. An exception is perhaps the Raven test that seems to be higher on average in the session with neutral mood induction: we will argue below that this is consistent with our hypothesis.

We begin with a comparison of rates of cooperation across treatments before looking at best response dynamics (with reference to an analysis of basins of attraction), an examination of the accuracy of beliefs and an analysis of the text used in pre-play communication.

### 2.3.1 Comparative Statics across Treatments

Figure 2.1 reveals our first and perhaps most surprising finding:

**Result 2.3.1.** *Participants in the neutral mood treatment cooperate more than participants in the positive mood treatment.*

Notice also that because participants cooperate more they also earn more in all treatments except for the finite variant of the Prisoners' Dilemma with chat, where the difference remains positive but is not significant, as we note from figure 2.3. This pattern is somewhat replicated in the sessions where we include belief-elicitation: in figure 2.2 participants in the neutral mood treatments cooperate more in the infinite variant of the Prisoners' Dilemma, with chat and in the finite variant without chat, while in the finite variant with chat the difference is smaller and the inequality is actually reversed. Accordingly, from figure 2.4 we note that – even in the sessions with beliefs – participants in the neutral mood condition earn more except in the finite variant of the Prisoners' Dilemma with chat.

An interesting pattern we note from figures 2.1, 2.3, 2.2 and 2.4 is that the differences between the sessions with different mood inductions are largest in the treatment with an uncertain number of repetitions of the Prisoners' Dilemma (the "infinite" treatment) without chat. Moreover the difference is very small in the finite Prisoners' Dilemma treatment with chat. This suggests that the role of mood, while consistent across treatments, interacts strongly with both the inclusion of pre-play communication and the duration of the repetition, which can both to some extent over-ride the impact of mood. To summarize:

**Result 2.3.2.** *Adding uncertainty to the number of repetitions reduces the difference in the level of cooperation between mood treatments.*

**Result 2.3.3.** *Adding pre-play communication reduces the difference in the level of cooperation between mood treatments.*

Finally we note the following:

**Result 2.3.4.** *The inclusion of pre-play communication increases the propensity to cooperate.*

This result is consistent with the existing literature on cooperation absent the inclusion of mood, for instance see (Embrey et al., 2015).

### 2.3.2 Best Response Dynamics and Basins of Attraction

Subgame perfection is of limited value (especially in the finite setting where the only subgame perfect Nash equilibrium is to always defect). Moreover, we know (from the results in this paper and those of countless others summarized in Embrey et al. (2014) and Dal Bó and Fréchette (2014)) that cooperation occurs even in a finite setting especially early in the life of any supergame. One way to consider how players might make sensible decisions when they are aware that cooperation is a possibility is to think in terms of which strategy might result in the highest payoff

conditional on the parameters of the game and beliefs about the probability that the rival player will play in a cooperative way. Dal Bó and Fréchette (2011) provide the method we need by thinking in terms of basins of attraction. In short, the idea is to assume only two extreme strategies: a “grim” strategy and an always defect strategy. The “grim” strategy is defined as a strategy in which a player initially opts to cooperate but always defects after a single instance of defect by the other player. The “always defect” strategy simply involves playing defect in all periods irrespective of the actions of the other player. Assuming these are the only strategies considered, the basin of attraction is the set of beliefs (on the actions of the other player) for which a particular strategy is optimal. Appendix H provides full details for the computation of the basins of attraction.

In figure 2.5, we observe the dynamics of the cooperation rates in the different treatments and in the different supergames. In the treatment without chat we observe a declining pattern in cooperation, in the sessions with pre-play communication cooperation seems to be constant, apart from the end of game effect in the “finite” setting with chat (the bottom-right panel). The diamonds represent the *basin of attraction* of always defecting in rounds 1 of each supergame, as defined by Dal Bó and Fréchette (2011). From figure 2.5 we note that the share of individuals cooperating in the first rounds are well above the threshold for the basin of attraction surrounding the grim strategy (which requires an initial action of cooperate), hence considering the empirical frequency we can argue that most of the subjects should best respond by choosing to cooperate in the first round.

In the neutral treatment there seem to be more participants that best respond (by cooperating) in round 1 than in the positive mood treatment, although the difference is not significant. Figure 2.8 is related to the sessions in which we elicited beliefs from participants prior to their choice of actions. The four panels report the share of subjects which reported beliefs about their partners above the basin of attraction of defecting in the 1st round and consistently with these beliefs, chose to

cooperate. Hence we can argue these subjects are better at best-responding to their partners' expected strategies. We note that in both the "infinite" setting with chat and the "finite" setting without chat, participants in the neutral mood treatment are more likely to best-respond than participants in the good mood treatments. We can summarize:

**Result 2.3.5.** *Participants in the neutral treatment best-respond more frequently than in the positive mood treatment.*

Note however that in the "finite" setting with chat, the difference is not significant.

### 2.3.3 Accuracy of Beliefs

Next we consider beliefs. In figure 2.9, we report the errors in predicting partners choices, defined by the absolute difference between the stated probability of their partners' cooperation and true behavior. Participants in the neutral mood condition make on average fewer errors than subjects in the "infinite" setting with chat and in the "finite" setting without chat.

We also see that neutral treatment participants seem to have more accurate beliefs when we consider all rounds as in figure 2.10.

To summarize:

**Result 2.3.6.** *Participants in the neutral mood treatment have more accurate beliefs about their partners' choices.*

Once again we do need to note a caveat: the difference is not significant in the "finite" setting with chat.

### 2.3.4 Text Analysis of the Pre-play Communication

In this section we provide a brief analysis of the text contained within the pre-play communication in the "chat" treatments. In figure 2.11 we calculate the positive and

negative emotions contained within the words included in the text messages transmitted between partners prior to the start of each super-games using text-analysis software (Pennebaker et al., 2001). Consistent with our earlier results we find that subjects in the positive mood sessions are less cooperative. We observe that the text within the pre-play messages feature less positive emotion and more negative emotion than in the sessions with positive mood induction. Recall that mood induction occurs prior to the opportunity to engage in pre-play communication, and so the text analysis seems to be indicating that participants in the positive mood induction treatment are less positive in their dialogues with their partners.

We also analyzed the use of the pronoun “I”, generally considered a sign of inward orientation. In figure 2.12 we observe that participants in the positive mood treatment make more use of the pronoun “I” than participants in the neutral mood treatment. Summarizing:

**Result 2.3.7.** *Participants in the positive mood treatment are less positive in their communication and more inward-oriented.*

We argue in the next section that this finding seems consistent with our finding that participants in the positive mood treatments are also less cooperative.

## 2.4 Concluding Remarks

In this paper we examine the causal relationship between mood and cooperative behaviour under repeated setting. We use a combination of Velten MIP and Music MIP to induce positive mood and neutral mood in a controlled lab environment. Participants play repeated PD with two other treatments: *chat* -where we allow pre-play communication; and *finite* where the repetition is either finite or infinite.

Our results suggest that in games of cooperation mood undoubtedly matters; in particular, players in a positive mood are less prone to cooperate. This holds for both finite and infinite repetitions, but the difference is more robust in infinite

repetitions. Everything else being equal, subjects in positive mood exhibit lower levels of cooperation. This seems to be because individuals in a neutral mood have better accuracy of belief and are closer to a best response with respect to their beliefs. Both effects seem to support the notion that individuals in a neutral mood have superior cognitive skills and for this reason perform better in a strategic environment, which confirms the findings in Gill and Prowse (2016) and Proto et al. (2014). In addition, our text analysis of pre-play communication suggested that individuals in a positive mood can be more inward-oriented.

Our results lend support to the notion that cognitive and emotional function of the brain influence each other (Damasio, 1994) and offer an explanation as to why in one shot games – where there are fewer or no strategic interactions – positive mood generates more cooperative behaviour, while under repeated interaction – where strategic interactions involve a greater need for cognitive functions – positive mood lead to a reduced incidence of cooperation. This also explains the finding in Oswald et al. (2015) that better mood boosts productivity: the task examined in that paper does not involve cooperation or any form of strategic interaction.

The main contribution of this paper is that it systematically establishes a causal relationship between positive mood and cooperative behaviour and provides evidence on the mechanisms of the same.



## Tables & Figures

Table 2.1: Stage Game

	Cooperate	Defect
Cooperate	51, 51	22, 63
Defect	63, 22	39, 39

Table 2.2: Differences in mean across treatments

Variable	Neutral	Positive	Differences	Std. dev	N
Age	28.37	21.22	7.15	84.06	552
Female	.63	.65	-.01	0.47	552
Extraversion	3.29	3.34	-0.05	0.47	552
Agreeableness	3.65	3.61	0.36	0.52	552
Conscientiousness	3.52	3.55	-0.02	0.51	552
Neuroticism	2.94	2.94	-0.01	0.57	552
Openness	3.40	3.36	0.04	0.46	552
Risk Aversion	0.56	0.56	-0.01	0.12	552
Raven <sup>†</sup>	17.82	17.22	0.59*	4.19	534
Stated Mood	3.63	3.85	-0.22***	0.74	552

<sup>†</sup> except session 14

Figure 2.1: Cooperation rates in the different treatments

The four panels report the cooperation rates computed over observations in all neutral and positive mood sessions, aggregated separately for all different treatments; bands represent 95% confidence intervals.

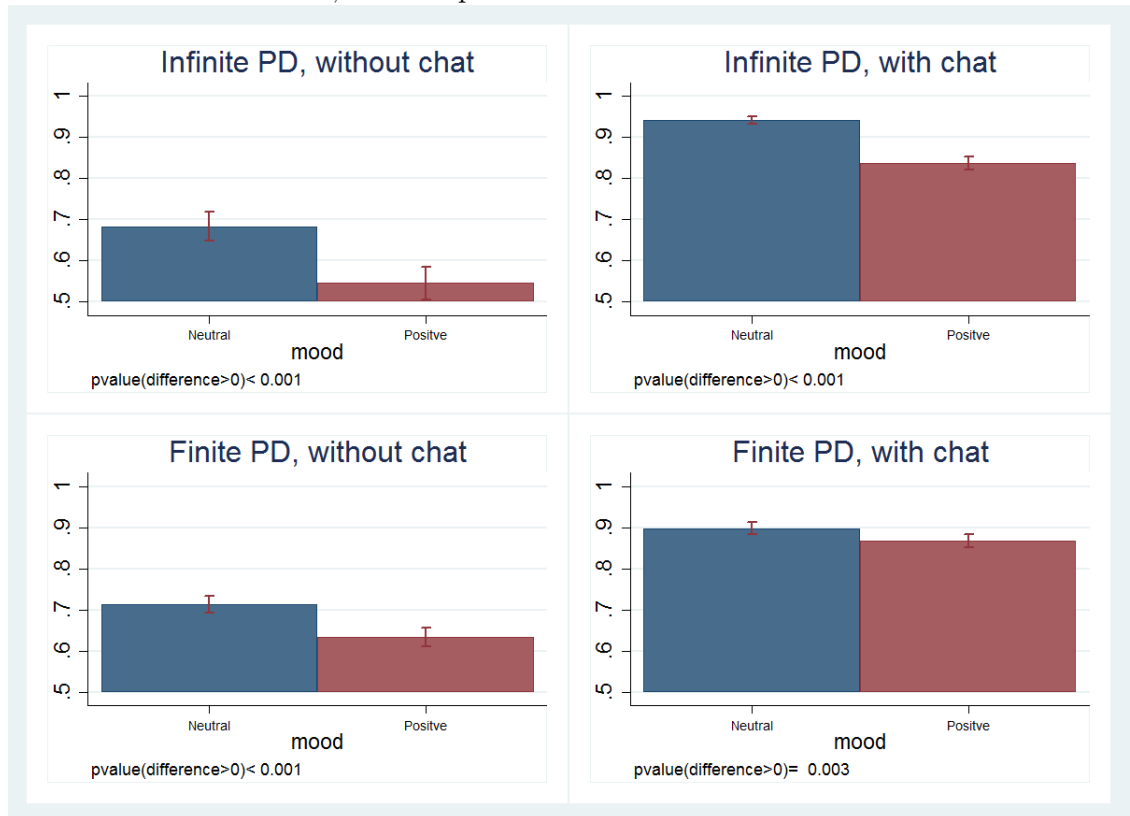


Figure 2.2: Cooperation rates in the different treatments in the sessions with beliefs.

The four panels report the cooperation rates computed over observations in all neutral and positive mood sessions, aggregated separately for all different treatments; bands represent 95% confidence intervals.

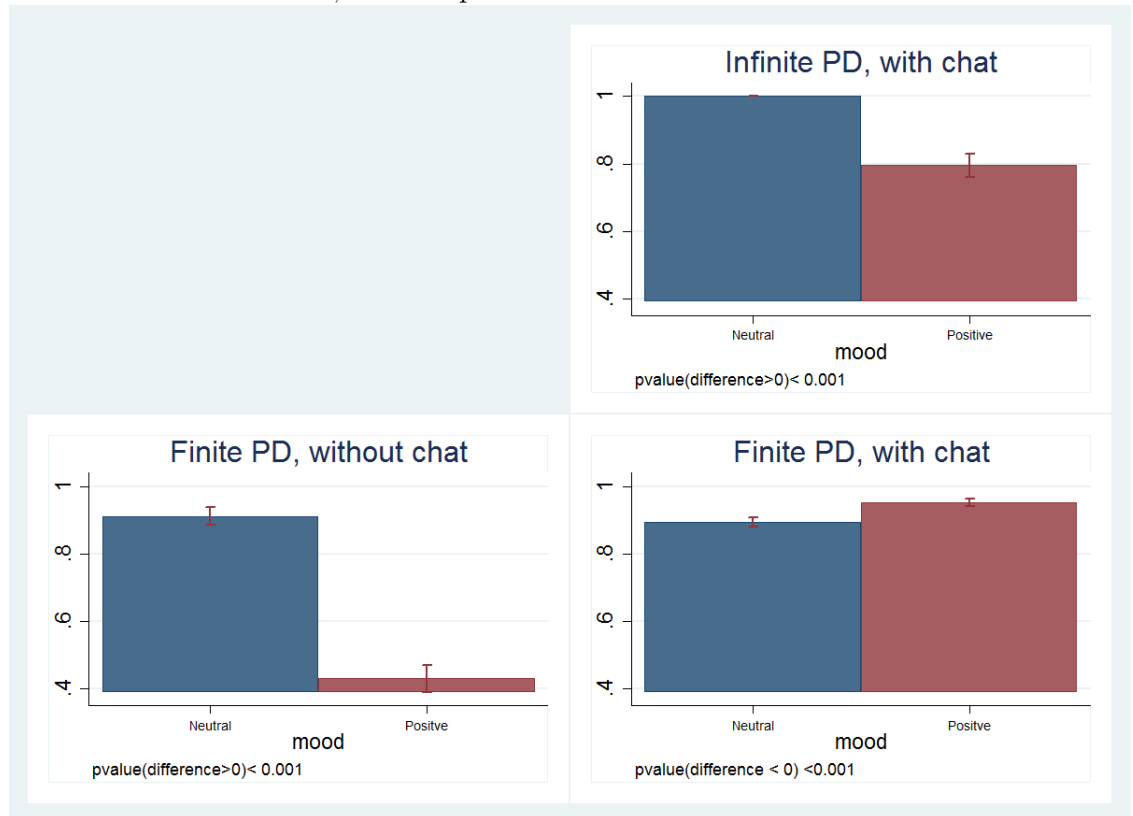


Figure 2.3: Average payoffs in the different treatments.

The four panels report the average individual payoffs earned in each round computed over observations in all neutral and positive mood sessions, aggregated separately for all different treatments; bands represent 95% confidence intervals.

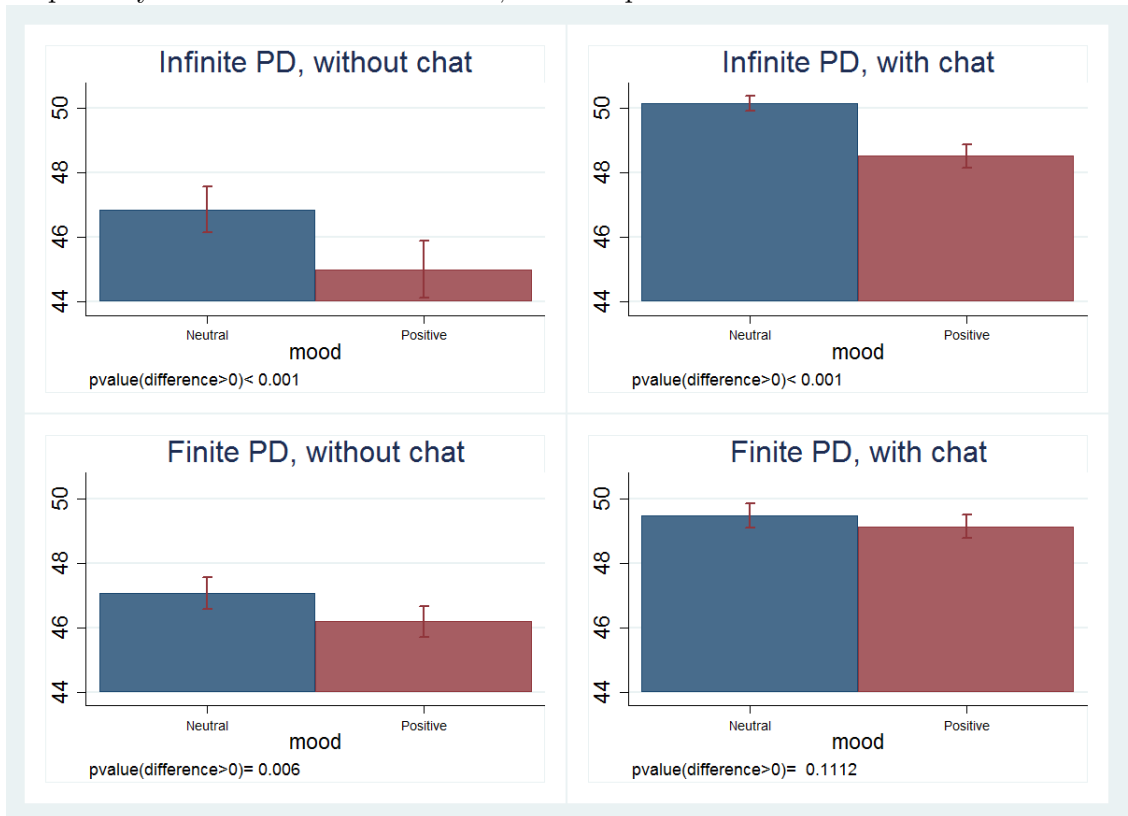


Figure 2.4: Average payoffs in the different treatments in the sessions with beliefs.

The four panels report the average individual payoffs earned in each round computed over observations in all neutral and positive mood sessions, aggregated separately for all different treatments; bands represent 95% confidence intervals.

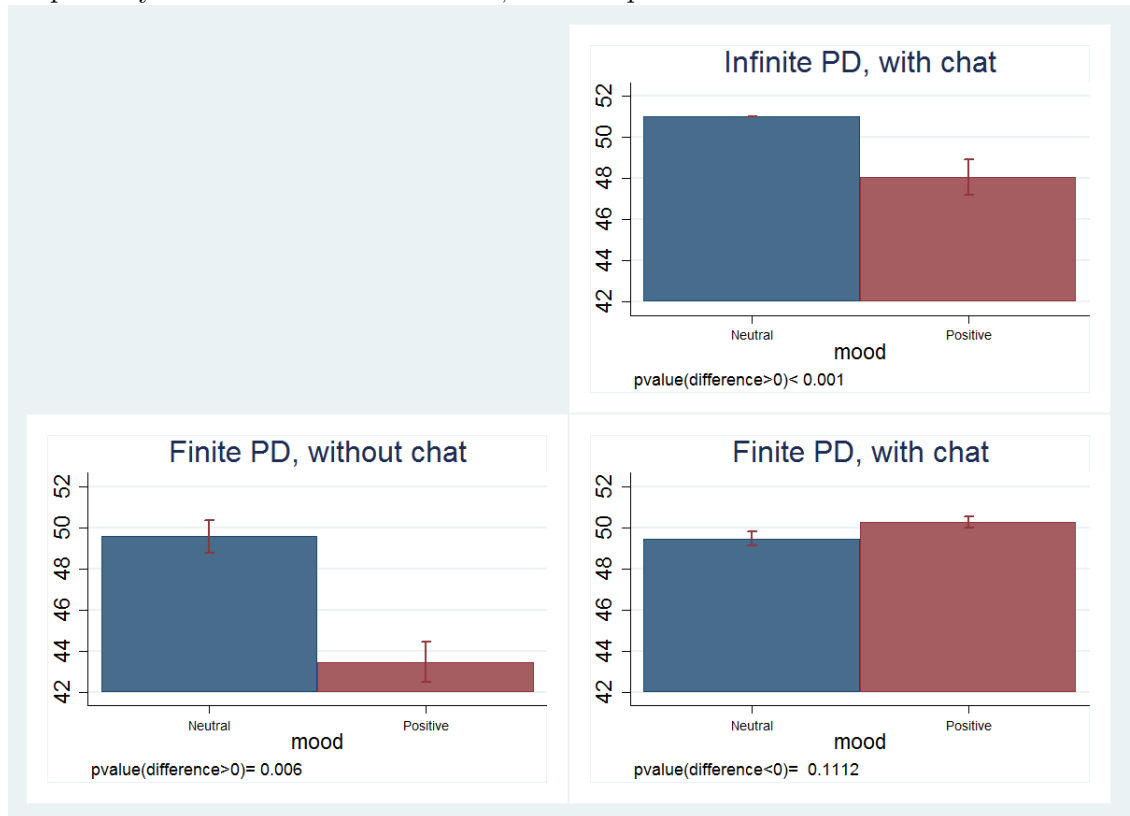


Figure 2.5: Cooperation rates per round in the different treatments.

The four panels report the cooperation rates per round computed over observations all neutral (blue colour) and positive (red colour) mood sessions, aggregated separately for all different treatments; the dashed red lines mark the end of each of the 3 supergames per session. The black diamond mark the basin of attraction of cooperation in the 1st period of each supergame.

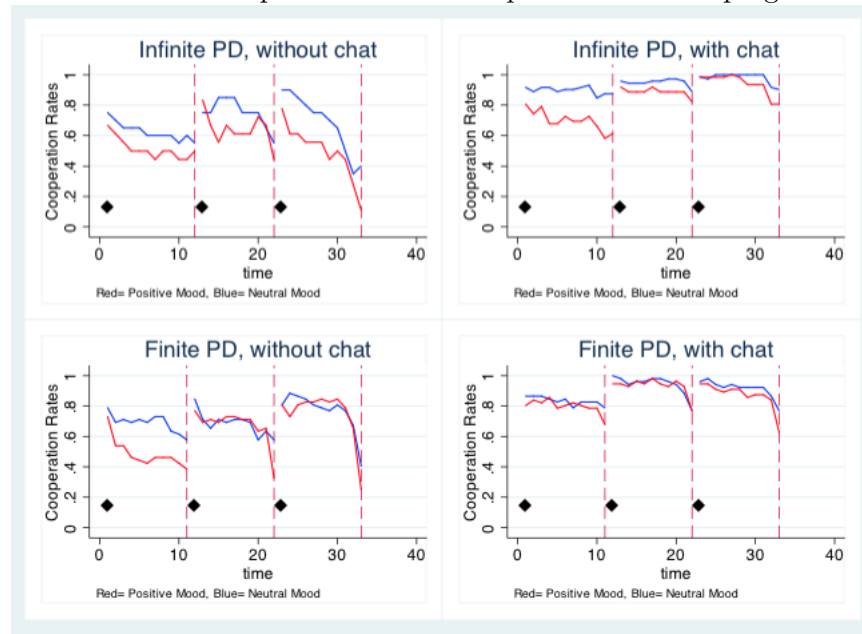


Figure 2.6: Cooperations rates per round in the different treatments in the sessions with beliefs

The four panels report the cooperation rates per round computed over observations from all neutral (blue colour) and positive (red colour) mood sessions, aggregated separately for all different treatments; the dashed red lines mark the end of each of the 3 supergames per session. The black diamonds mark the basin of attraction of cooperation in the 1st period of each supergame.

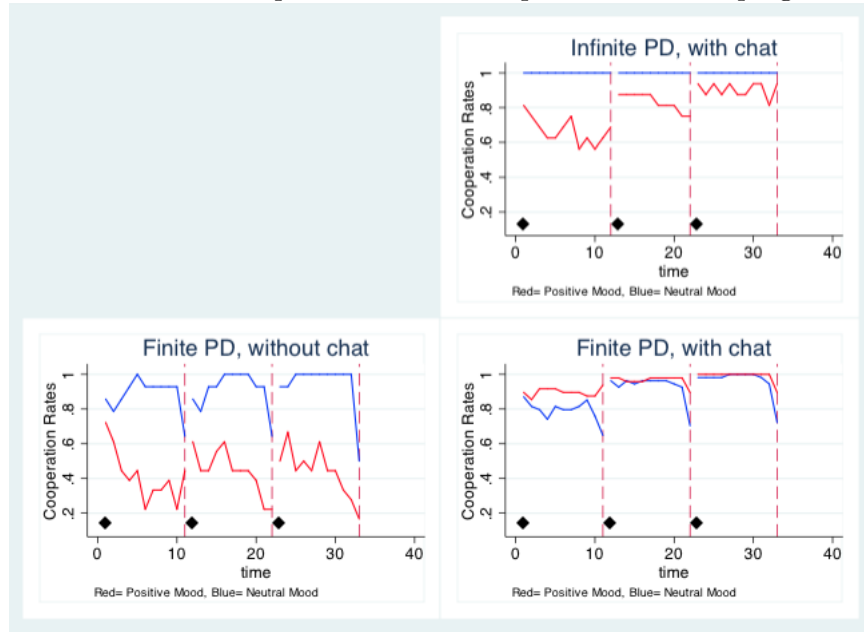


Figure 2.7: Cooperative choices consistent with beliefs in the first round.

The four panels report the share of the cooperative choices when individuals' beliefs about partners' cooperative choices are in the basin of attraction of the cooperative choices computed over observations in neutral and positive mood sessions with beliefs, aggregated separately for all different treatments; bands represent 95% confidence intervals. .

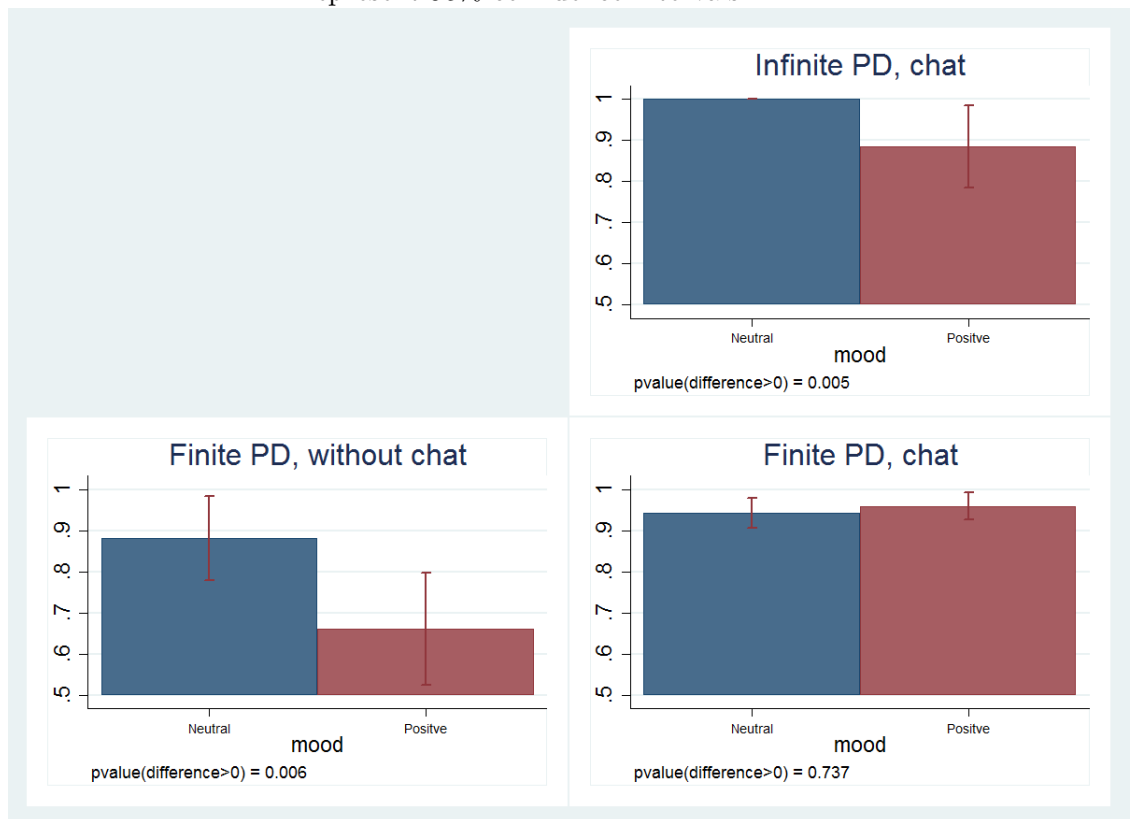




Figure 2.8: Choices consistent with beliefs in the first round.

The four panels report the share of choices consistent with beliefs about partner choices computed over observations in neutral and positive mood sessions with beliefs, aggregated separately for all different treatments; bands represent 95% confidence intervals. .

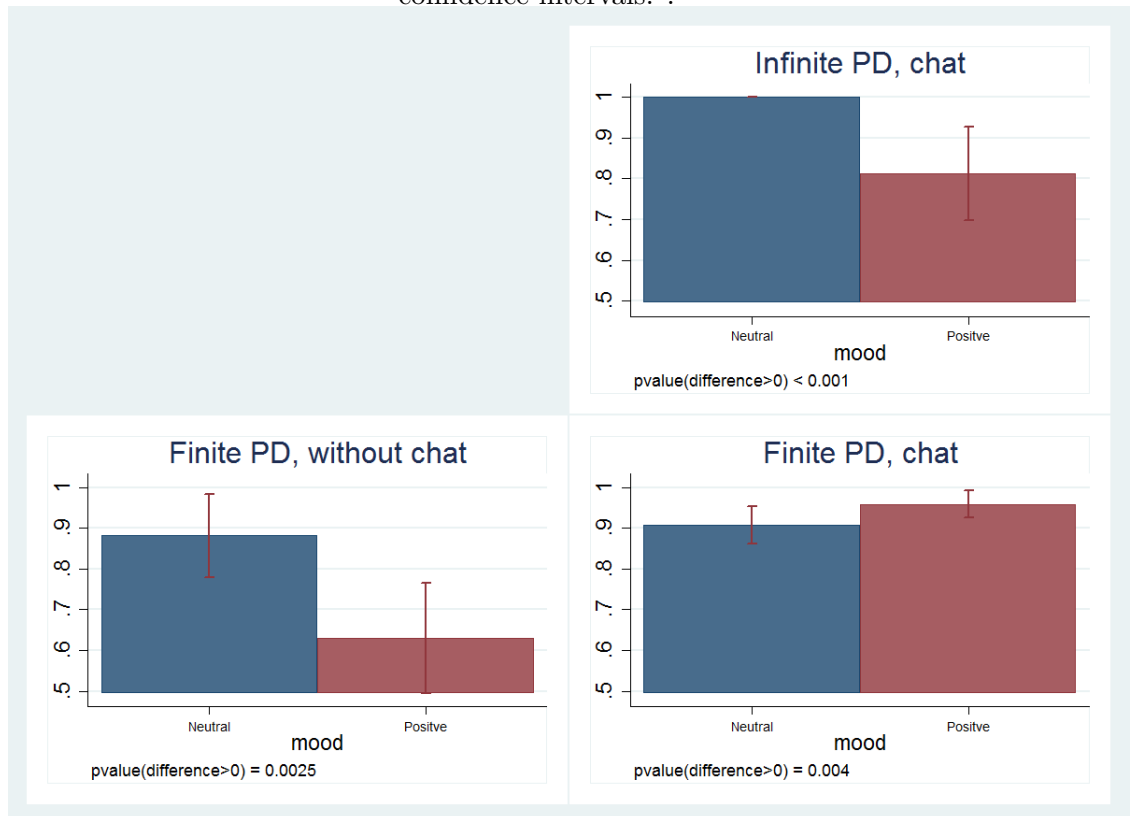


Figure 2.9: Errors in the beliefs about partners' choices in the first rounds.

The four panels report the average errors in the beliefs in the first round of each supergame, defined by the absolute difference between the stated probability of partners' cooperation and the actual choices. They are aggregated separately for all different treatments with beliefs; bands represent 95% confidence intervals.

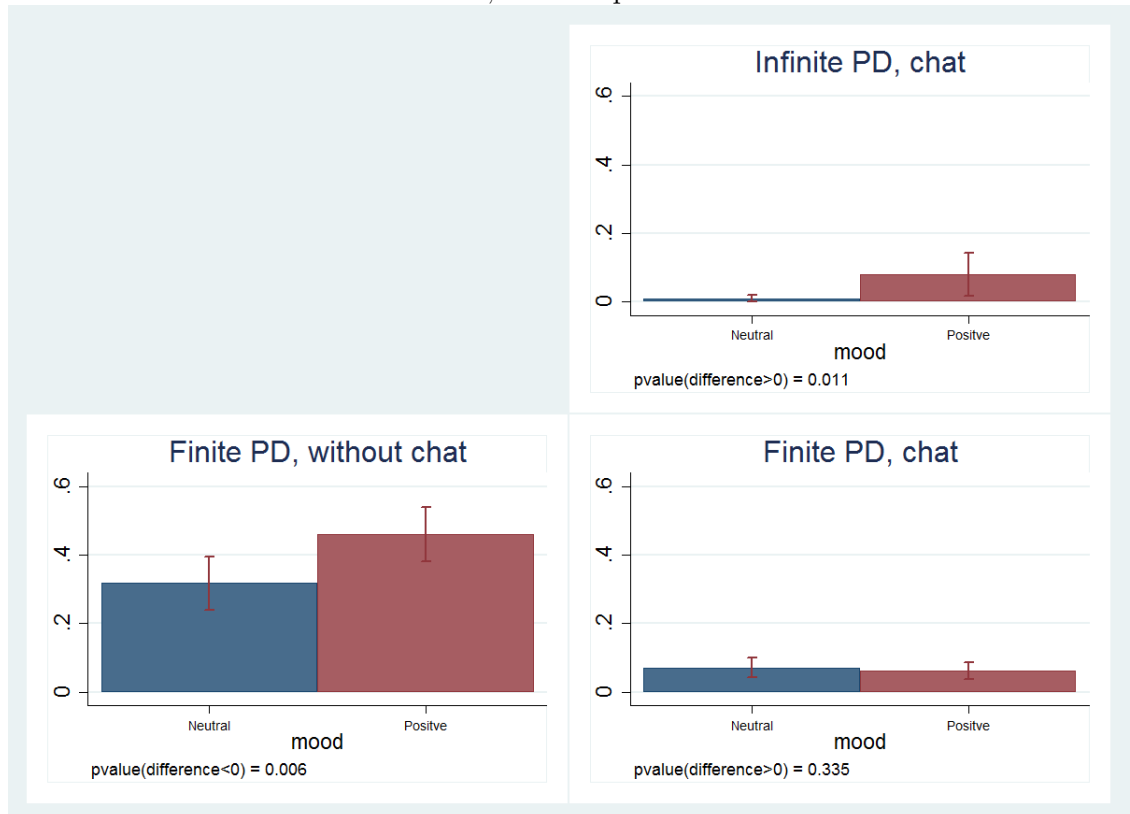


Figure 2.10: Errors in the beliefs about partners' choices.

The four panels report the average likelihood error in the beliefs about partners' cooperative choices in every round of each supergame, aggregated separately for all different treatments with beliefs; bands represent 95% confidence intervals.

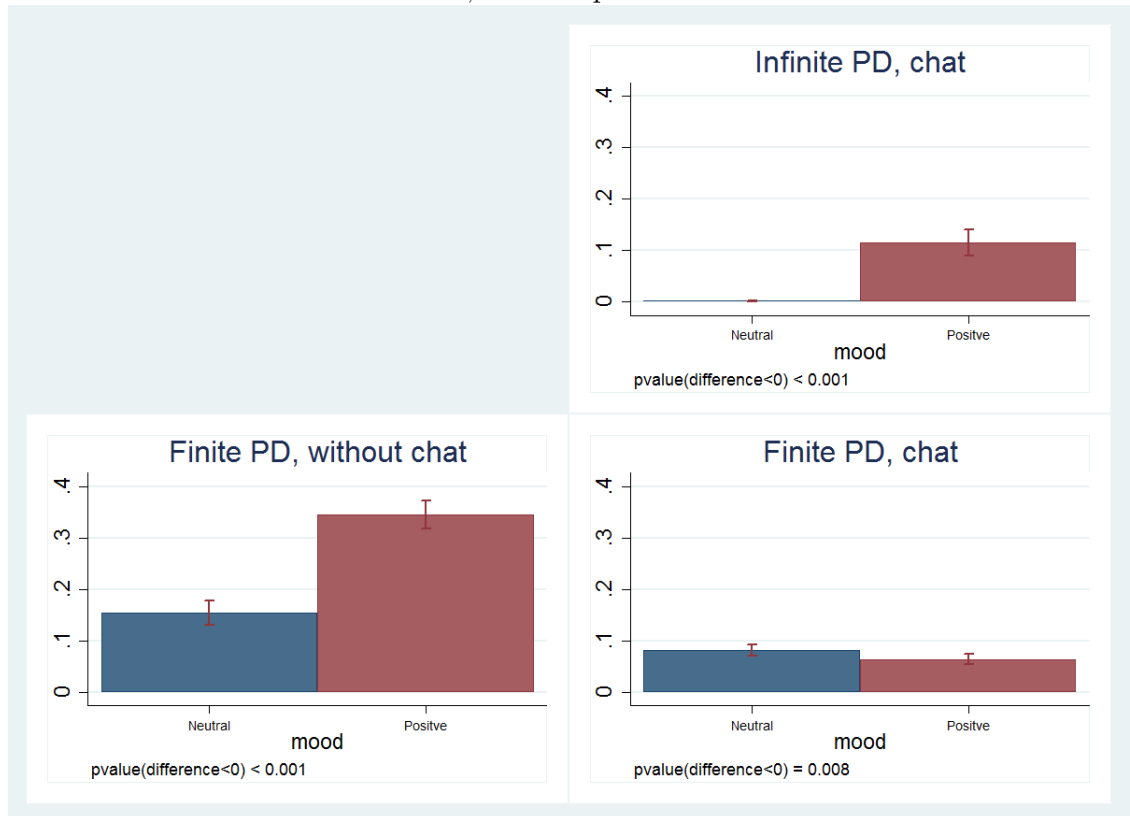


Figure 2.11: Emotions in the text analysis of the chat

The six panels report the average positive and negative emotions calculated from the text in the pre-play communication at the beginning of each supergame, aggregated separately in the positive mood (red) and neutral mood (blue) sessions; bands represent 95% confidence intervals.

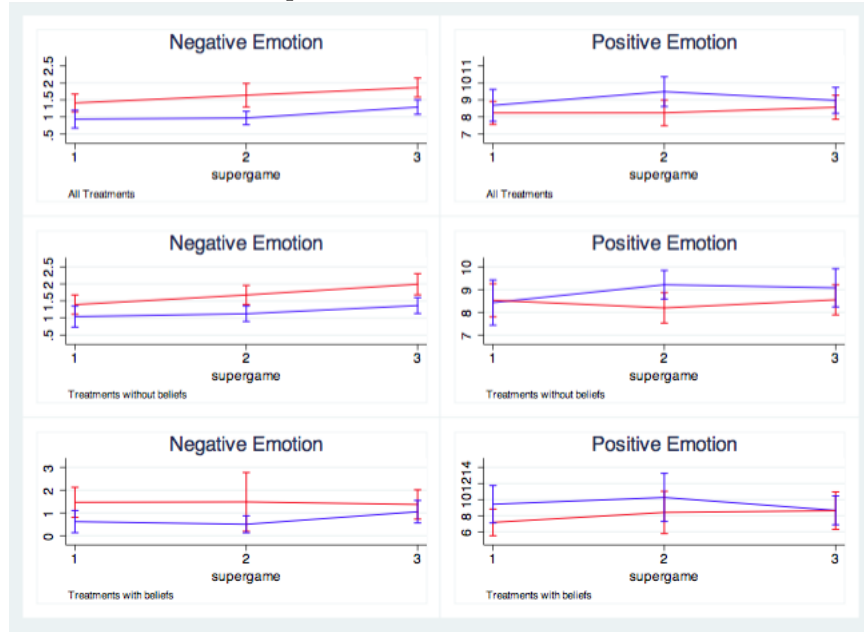
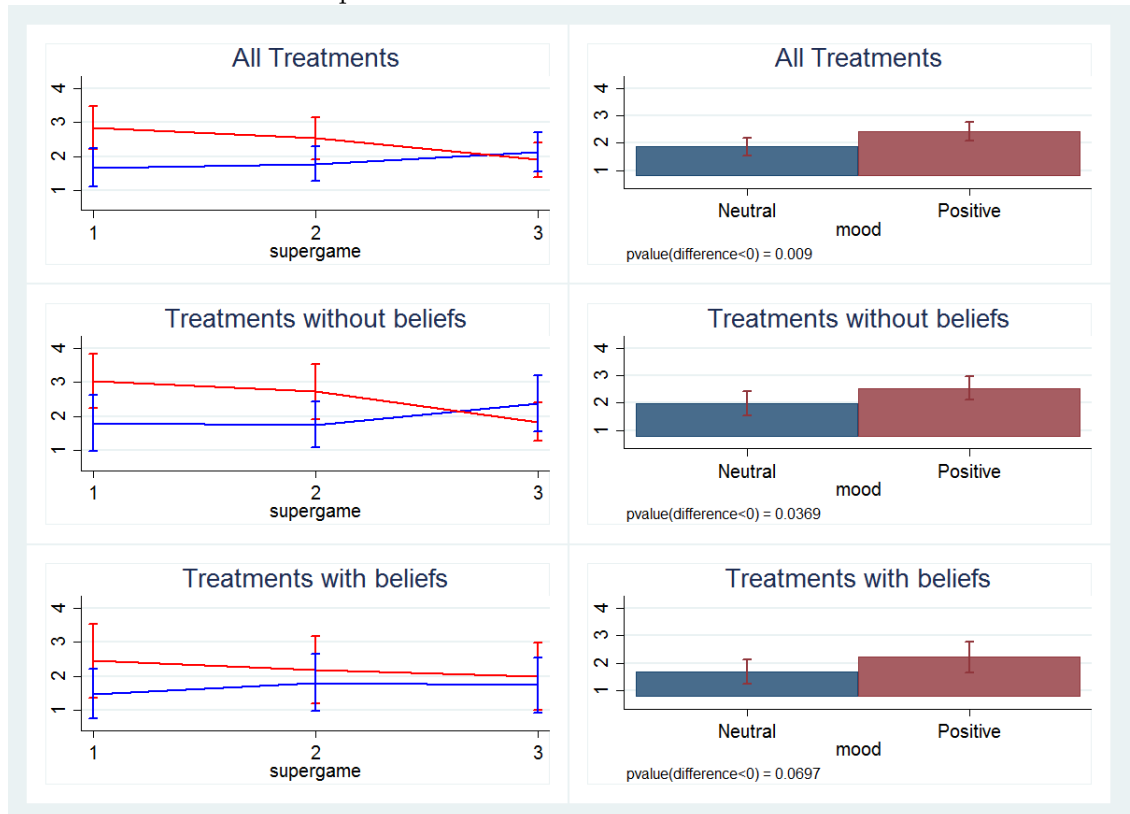


Figure 2.12: Use of the pronoun “I” in the text analysis

The six panels report the average number of times the pronoun “I” is used in the pre-play communication at the beginning of each supergame, aggregated separately in the positive mood (red) and neutral mood (blue) sessions; bands represent 95% confidence intervals.



## Chapter 3

# Mood, Risk and Belief: Motivations in Social Dilemma

### 3.1 Introduction

Social dilemmas isolate a conflict between collective welfare and personal interest; the contribution to a common resource helps all the other members of the group but at a personal cost to the contributor. One of the most commonly used games in economics to capture the essence of social dilemma is the Public Goods (PG) game. This is essentially a scenario where groups of two or more people allocate their individual endowment between a private account that benefits only them, and a public account, where the sum of all contributions is multiplied by an efficiency factor and shared equally between all group members. The PG game has a Pareto efficient solution where players cooperate, contributing the maximum; but a different Nash equilibrium where according to the standard economic model of utility, players act purely self-interestedly and free ride by contributing a minimum amount or nothing. Empirical evidence shows that, contrary to the standard economic model, PG game players usually contribute something and contributions range from zero to 100% of endowment with an average contribution of about 50% (Fischbacher et al., 2001).

Another game that encapsulates a social dilemma scenario is the trust game<sup>1</sup>. In this game a trustor decides to send some money over to a trustee which the experimenter multiplies by a factor. The trustee has the option to return some of that money. Pay-off maximising behaviour of trustor and trustee implies that the trustee would indeed abuse trust, if trust is placed. Assuming that the trustor anticipates this, he/she does not place trust in the first place. If trust is not placed, however, both trustor and trustee are worse off than when trust is placed and honoured. This outcome however is suboptimal. Such a conflict between individual and collective reasoning is the core feature of a social dilemma.

In this paper we look at these social dilemma games with the idea of multiple motives. The main idea is that individual behaviour depends on the interaction of multiple motives.<sup>2</sup> Motivated by the results from Chapter 2 of this thesis, this chapter specifically looks at the interaction between mood and choices in social dilemma. We also explore the idea of multiple motives and see how individual's mood, risk attitude and belief about partner's choice, affects behaviour. In addition, we explore this relationship in a situation where individuals earn their 'endowment' or wealth by a real effort task and receive no feedback about their earning.<sup>3</sup> We induce mood by a combination of two Mood Induction Processes (MIPs): the Velten MIP and Music MIP. After completing a real effort task, participants are randomly matched in groups of two to make decisions in a one shot PG game and trust game,

---

<sup>1</sup>Some variation of this game is also known as the investor game or gift exchange game.

<sup>2</sup>For example, Engel and Zhurakhovska (2016) examine behaviour in a one shot Prisoner's Dilemma (PD) game. They considered multiple motives: *fear*- measured by risk aversion and loss aversion; *greed*-opposite of generosity measured with a risky dictator game; *efficiency*-measured by the size of pay-off from cooperation and *conditional cooperation*- participant's belief about the cooperativeness of the other players. They found all four motives significantly affected cooperation but some individually, only if the other three motives were controlled for. In their view this explained why earlier studies that examined only one motive did not show significant results.

<sup>3</sup>We call this feature of the design as *ambiguity*, meaning: *the quality of being open to more than one interpretation; inexactness..* This is not used in the traditional meaning of the word in economics, rather is used to present a scenario where subjects are not given full information about their earning in the real effort task. We include this feature to check if the information environment has any affect in the choices under the two mood conditions. This is again motivated from the results in chapter 2, we wanted to further explore how mood affects decision making process under different settings.

where they are paid for one of the tasks. We elicit beliefs by asking participants to state how much they believe their partner is going to contribute, which are incentivised using a quadratic scoring rule. Risk preferences are measured using the 30 item DOSPRT questionnaire and one specific question on social risk.<sup>4</sup>

We find that, participants in positive mood receive higher score in the real effort task and on the GMAT test<sup>5</sup>. However, we find that mood has no effect on contributions made in the PG game or the offers made in the trust game, but belief is highly significant in both cases. Our results suggest that the effect of mood on choices are sensitive to the information environment and strategic interaction. Positive mood seems to enhance performance in tasks which require individual effort, but the effect disappears when one shot strategic decisions are involved.

The paper is organized as follows: section 3.2 reviews the relevant literature. Section 3.3 describes our experimental design and its implementation, section 3.4 presents our results and discussions and section 3.5 offers some concluding remarks.

## 3.2 Literature Review

Although standard economic theory suggests that the source of income or an endowment should not affect people's preferences and their associated choices, this is contradicted by empirical evidence. Notable examples are Muehlbacher and Kirchler (2009) who argue that experiments where participants are given windfall money to fund their risky decisions are unrealistic since this rarely happens in real life; Arkes et al. (1994) show that people spend windfall gains more readily than expected income; Loewenstein and Issacharoff (1994) show that people who obtained a mug by performing a task valued it more highly than those who obtained one by chance and those who earned a mug by strong performance valued it more highly than those who earned one by weak performance. Cherry et al. (2005) show that participants

---

<sup>4</sup>the additional risk question followed from Cubitt et al. (2015) was added as a robustness check.

<sup>5</sup>The GMAT test is used as a test of cognitive skill



in UGs and Dictator games tend to give less when they earn their endowments, rather than receive them from the experimenter.

For the PG game, expending effort to earn an endowment may be expected to increase its subjective value from the participant's perspective and reduce his or her inclination to spend it. Additionally, because the participants may consider their endowment compensation for their efforts, they may be less willing to take the risk of contributing to the public account. However, empirical evidence supporting this idea is mixed. Cherry et al. (2005) found no evidence of a relationship between contributions in PG and endowment sources, Muehlbacher and Kirchler (2009) found that participants who earned their endowments by exerting a high level of effort contributed less than low effort participants, whereas Oxoby and Spraggon (2006) found participants with higher effort contributed more. In this study, we use a real effort task to see if mood affects the level of effort put in by participants under the two conditions and to check if this extends to their choice of contribution amount.

A large number of factors have been found to impact the level of cooperation in the PG game. Wilkinson and Klaes (2012) examine individual differences such as age, culture and family background; Sally (1995) looks at the framing of the instructions, and Ledyard et al. (1997) looks at repetitions of the game. Rand et al. (2012) investigates the cognitive basis of cooperative decision-making by using a dual process framework. They use economic games to see if people are predisposed towards selfishness. There are a few important findings of the paper, first they show that if subjects are primed to trust their intuitions, it increases contributions compared to a prime that promotes greater reflection. Second, forcing subjects to decide quickly increases contributions, whereas instructing them to reflect and forcing them to decide slowly decreases contributions. Finally, they find subjects who reach their decisions more quickly are more cooperative. Although we do not directly test for the causal relationship between response time and cooperation in our study, our results indicate that there is no difference in the response times under

the two mood conditions which could explain why we also do not find any difference in contributions. Drouvelis and Grosskopf (2016) find that people contribute more in a PG game when induced with positive mood, compared to angry mood. In our study we find no difference in amount of contributions made in the two mood conditions. One possible reason could be that we compare positive mood to neutral mood, where as in their study Drouvelis and Grosskopf (2016) compare positive mood to angry mood.

One of the earliest papers to look at trust and reciprocity in an investment setting was Berg et al. (1995). Ever since then, studies have identified a variety of characteristics that are important in determining and sustaining trust. Bohnet and Zeckhauser (2004) show that individuals require an additional ‘risk premium’ to offer their trust, which highlights that there is an inherent element of risk involved when trusting others. Ashraf et al. (2006) find that expectations of high returns as well as unconditional kindness are important predictors of trust choices in a trust game. In this paper we find both risk preferences and beliefs or expectations of partners return are important indicators of trusting behaviour. Kirchsteiger et al. (2006) examined behaviour in the trust game where participants were induced with either good or bad mood using a funny or sad movie clip. They found that, although initial offers were higher or more generous in a good mood, over time those in a bad mood were more reciprocal. In the one shot version of the trust game in our study, we find no such evidence. Other empirical findings show that people in a positive mood are more likely to follow designated social norms (Hertel et al., 2000); view selfish behaviour less negatively (Drouvelis and Powdthavee, 2015) and both trust and distrust others more when given appropriate cues (Lount Jr, 2010).

Economic experiments with mood also continue to challenge the standard economic assumption that people have fixed sets of preferences. Guiso et al. (2013) looked at investment data and a customer questionnaire from an Italian bank and found that fear drove risk aversion in financial markets shortly after the 2008 finan-

cial crash. This was true even for those unlikely to have been financially affected themselves. The authors suggest that this could be a sort of contagion effect but equally it could be that the beliefs of how others will behave matters more to people. The authors also found a similar level of increased risk aversion when testing their findings in a laboratory experiment by asking participants to make monetary gambles after watching a horror movie clip. This suggests that the impact of mood on peoples economic decision making may be directly related to risk.

In this chapter, we explore the interplay between mood, risk and beliefs in a social dilemma setting with limited information.

### 3.3 Experimental Design

A full details of experiment instructions are present in appendix J. Details of the mood induction process, the games and implementation are described below.

#### 3.3.1 Mood Induction Process

A mood induction procedure (MIP) is a technique used to influence the mood of the participants in an experiment; towards being elated or depressed or inert. We simultaneously apply a combination of two mood induction processes, namely, the Velten MIP and Music MIP, as it has an additive influence on effectiveness (Bower, 1981). The Velten MIP involves reading and reflecting on the meaning of a number of statements. In the positive mood induction settings, the statements describe somatic states or self-evaluations. An example of a statement under the positive setting is *If your attitude is good, then things are good, and my attitude is good* (Velten, 1968). In the neutral state, participants are presented with trivial and factual statements which carry no emotional load. For example, *The orient express travels between Paris and Istanbul*. A detailed list of the statements are provided in appendix N. In our experiment we use the 50 statement version of Velten following

Isen and Gorgoglione (1983). In order to induce a more sensory method of induction, a Music MIP was used. Implementation of this procedure is rather straightforward as it mainly involves getting participants to listen to a piece of music. In the positive condition we used Mozart’s *Eine kleine Nacht Musik Allegro*. In contrast, subjects in the control group were required to listen to the neutral piece of music *Aerial Boundaries* by Michael Hedges. The whole mood induction procedure lasted for approximately 7.5 minutes.

### **3.3.2 The Games**

#### **Real Effort Task**

After the mood induction process, subjects participate in three separate tasks. We implement a real effort task game for subjects to earn their endowment which is traditionally given by the experimenter as an endowment. Studies have found that individuals perform differently in tasks when they have to earn the money compared to when money is simply given to them (Muehlbacher and Kirchler, 2009). The real effort task we use is the Encryption Task. Subjects are given an encryption table which assigns a number to each letter of the alphabet in a random order. Each subject is then presented with words in a predetermined sequence (which is the same for all participants) and is asked to encrypt them by substituting the letters with numbers using the encryption table. The task was repeated for 5 rounds, each round for 2 minutes with 10 second break in between for a total of just over 10 minutes. A screenshot of the task is presented in appendix K.

#### **Public Goods Game**

We use a one shot PG game. Participants were asked what percentage of their endowment they wish to contribute to the purchasing of a public good with their

partner.<sup>6</sup> It was explained that their pay-off is their endowment less the combined group fund multiplied by 1.5 by the experimenter and then divided equally among the two of them. More explicitly, participant's individual pay-off function is expressed as:  $payoff = endowment-contribution + (group\ fund \times 1.5) \div 2$

Once the participants choose an amount to contribute we ask them to predict how much they think their partner will contribute. A participant's pay-off for the belief task depends on how close their estimate is to their partner's actual contribution. A quadratic function rule was used to incentivise the belief elicitation. Specifically, the stated likelihood "R" was entered into the following formula, where "r" denotes the realized action of the partner. E is the experimental unit earned from belief elicitation. One randomly chosen E was then multiplied by £1 and added to the participants earning.

$$E = 1 - \left( \frac{R}{100} - \frac{r}{100} \right)^2$$

### Trust Game

We use the standard one shot two-person trust game. Each subject was randomly and anonymously matched with another participant in a pair. We use the strategy method where each participant makes conditional decisions for each possible role, in this case as both sender(trustor) and receiver(trustee).<sup>7</sup> We also elicit belief about their partner's choice in both roles. The same scoring rule was applied to incentivise this belief elicitation. The payoff functions for the sender and receiver are:

$$Sender\ payoff = (endowment-offer\ amount) + return\ amount$$

$$Receiver\ payoff = endowment + (offer\ amount \times 2) - return\ amount$$

---

<sup>6</sup>It was explained that endowment here is what subject's received based on their performance in the real effort task.

<sup>7</sup>We used the words *sender* and *receiver* instead of trustor and trustee to avoid using loaded language.

### 3.3.3 Questionnaire

After completion of the tasks the participants were asked to fill out a simple questionnaire. The form included questions on personal information such as their age, gender, current degree course, native language, country of origin, year of study and political affiliation (a scale from 1 to 7 ranging from *far left* to *far right*).

To measure intelligence 5 GMAT-style questions were asked followed from Gneezy and Rustichini (2000) to distinguish between effort and ability. A full list of questions is available in appendix M.

A 30-item DOSPERT questionnaire was used to elicit risk preferences of participants following (Blais and Weber, 2006). The DOSPERT questionnaire has 6 questions from 5 different risk domains: financial, ethical, social, recreational and health and safety. We also ask an additional risk question specifically on social risk taken from (Cubitt et al., 2015) study: *For personal reasons, you have to travel to a big city. From the airport you can choose between two taxi companies to reach your final destination for which you don't know the exact route. Company A charges you a fixed price of £12. Company B charges you according to the taxi meter. If the driver takes the direct route, it costs you £8. However, 1 out of 5 drivers take detours to make more money out of you and the fare is then £16. Which taxi company do you choose?*. Possible answers are either *Company A* or *Company B*.<sup>8</sup>. This additional question was asked as we were particularly interested in social risk perception of participants and we were keen to check if the results were consistent across the two methods used in this study.

To measure trust - two World Value Survey (WVS) questions were included to capture trust and fairness perception. According to (Thöni et al., 2012) the trust question is a proxy for individual's preference to cooperate rather than beliefs about others co-operation; whereas the fairness question is a proxy for individual's

---

<sup>8</sup>The original question is in USD currency, we adapt the currency to GBP to suit the subjects. A risk neutral subject would choose Company B, which has an expected cost of £9.6. We interpret the result as Company A (socially risk averse) and Company B (not socially risk averse)

beliefs and their optimism rather than their preferences. The trust question is: *Generally speaking, would you say that most people can be trusted or that you cant be too careful in dealing with people?* with the binary answer choice of either *most people can be trusted* or *cant be too careful..* The fairness question is: *Do you think most people would try to take advantage of you if they got a chance, or would they try to be fair?* with the binary answer choice of either *would take advantage of you* or *would try to be fair*.

To check for the mood induction process, participants were asked to recall and assess how they felt after listening to the music at the beginning of the session on a 5-point scale from Not at all Happy to Very Happy; and a general life satisfaction question. Such self-reports are usually held to be a valid approach for the measurement of emotions Robinson and Clore (2002).

Finally participants answered questions about how many of 4 defined bad life events (BLE) they had experienced: whether there has been bereavement in the close family; bereavement in the extended family; parental divorce or life-threatening illness. The BLE questions were asked last to avoid any impact on current mood through priming effects.

### **3.3.4 Implementation**

The experiment was conducted in a laboratory at the department of Economics at University of Warwick. Participants were recruited through the SONA recruitment platform. The study was conducted in a computerised lab equipped to accomodate 20 subjects per session. In total 8 sessions were conducted over 5 days with a total of 128 participants (dates in appendix I). The median age of the participants was 21; 76 were female and 124 of them were studying for a degree at Warwick. People were not eligible to participate if they were studying Economics; had been taught game theory or had participated in the study before. Subjects were paid for one of the tasks randomly chosen by the computer, either the PG game or the trust game

and this was made clear at the beginning of the experiment. The average earning was £15 including a show up fee of £4. Each session lasted for about 50 minutes.

### 3.4 Results and Discussion

We begin by looking at the demographic characteristics across the two treatments; neutral mood and positive mood. We look at the individual characteristics which may not be affected by the treatment or any other external factor. Table 3.1 shows the mean age, year of study, gender and native language of the participants in the two treatments. There is slight difference in age, but this is mainly because there were four participants aged above 40 in the neutral treatment (out of 64 participants in total). Excluding these subjects from the sample reveals no age difference between the two groups, analysis carried out without these four subjects are no different than what is presented here, so we keep them through out the analysis.

We now focus on our main results. To check if the mood induction process worked we check the self-reported data by the participants on their mood. Positive mood participants state a mean score of .682 compared to .447 for participants in neutral mood (normalised to a 0 to 1 scale), where 0 means *not at all happy* and 1 indicates *very happy*. The difference is an average score of -.234, which is statistically significant at 0.1% (p-value 0.000). The results were consisted with a Mann-Whitney U test which showed that the median stated mood was statistically different for positive mood and neutral mood (p-value 0.000) subjects. Figure 3.1 shows the difference in stated mood of the participants under the two mood conditions.

Next, we look at performance of individuals in the real effort task. Figure 3.2 shows the number of correct encryptions completed by subjects over the five periods. Each period lasted for 2 minutes, so the whole task was just over 10 minutes. Overall there is an upward slope which indicates that subjects get better with each period, so there is some learning effect. We believe the learning process



could be based on familiarity with how to use the key board efficiently. The red line indicating performance of participants in positive mood, is always above the blue line performance of participants in neutral mood. The difference is smallest in the fourth period but in the last period it again increases.

On average positive mood participant's can solve 9.55 encryptions, whereas neutral mood solves around 9.2 and the difference is significant at 5%. We use the measure *correct* as the proxy for effort put in by participants. A more general measure of effort would be the number of encoding attempted by the individual, which includes the encryptions which were incorrect. In our sample, 88% of all individuals made no mistakes in their encryption, the other 10 % made one error and less than 2% made more than one error. We use the more restricted measure of effort, which is the number of correct encryptions done by the individuals. We believe the task at hand was not reliant on ability so the measure *correct* is reflective of the effort put in by the individual. We can see from the graph that people in positive mood put in more effort across the five periods. This result is consistent with findings of Oswald et al. (2009) who find that relative to a neutral condition, happy participants were more productive in mental arithmetic tasks. Importantly, they did not find that cognition was improved such that happy participants were better at the game but that happy participants attempted more of the tasks in the allotted time and in doing so got more correct answers. This leads to our first result.

**Result 1:** *Participant's in positive mood show higher effort compared to participants in neutral mood.*

Next we examine behaviour in the PG game, especially on the contributions made by individuals in the game. We begin by looking at the average contributions made by subjects under the two mood conditions. Specifically, subjects were asked to state what percentage of their endowment they are willing to contribute to the public fund. We ask for percentage amounts instead of actual contribution amounts as the endowment earned from the effort task was not revealed to subjects after

the effort task. This was done to check if ambiguity about their endowment has any effect on mood effects. Appendix L shows the histogram of contributions made by subjects in positive and neutral mood. No significant statistical difference was found between the two distributions.

Figure 3.3 shows that mean offers in the neutral mood ( $M = 45.84$ ,  $sd = 31.53$ ) and positive mood ( $M = 49.64$ ,  $sd = 33.34$ ) are very similar and any difference is statistically not significant ( $p\text{-value} = .5092$ ).<sup>9</sup> We wanted to further examine the contribution amounts so we ran regression estimations where the dependent variable is *contribution* made in the game (value between 0 to 100) (table 3.2). In the first column, we see positive mood has no significant effect. We also add variables social risk aversion and beliefs, and as expected we can see belief is highly significant. In column 2 we add interaction variable for mood and risk preference. Here we can see that, positive mood has some effect, but only at 10% significance level. Risk aversion is important, the more risk averse an individual- the less is the amount of contribution. More importantly, belief is still highly significant.

It is possible that we do not find any consistent effect of mood on the contribution amount for the following two reasons. First, subjects are not informed about their actual endowment, this creates an ambiguity. Subjects not only have to decide how much they want to contribute but also how much endowment they actually have. There may be opposing forces nullifying the effect of positive mood on contribution amounts. In one way there may be optimism bias, which makes subjects in positive mood think they have a large endowment so they may choose a smaller percentage to contribute, or they may be more generous as indicated by the literature. We think it would be interesting to isolate the effects of these effects in future research. Second, we use a one shot interaction. It is possible the difference only arrives after repeated interactions. We can now state our second result:

**Result 2:** *Positive mood has no consistent effect on contributions made in*

---

<sup>9</sup>Additional non-parametric tests were carried out using the Mann-Whitney U test and the results were consistent with the findings of a ttest ( $p\text{-value} = .5819$ )

*the public goods game.*

The participants also played a one shot trust game. Here we look at the effect of mood on the offer made by player 1 (sender) and the amount of return chosen by player 2 (receiver). Similar to the PG game, here we also elicit *offer* and *return* amounts in percentages as endowment was not revealed to subjects. Appendix L shows histograms of the sender's and receiver's offer amounts in the trust game. Both distributions are slightly right skewed with spikes around the median. A test of distributions showed no statistical difference between the two mood conditions. Figure 3.4 and figure 3.5 show the average offers and returns made by senders and receivers in the trust game, respectively. As evident from the figure, there is almost no difference in the amount of offers/returns made by subjects in the two mood conditions. For the senders the difference in average offer in the positive mood ( $M=29.14$ ,  $sd=26.72$ ) and neutral mood ( $M=25.01$ ,  $sd=26.18$ ) is 4.125 (p-value 0.3794). For the receivers this difference in the return amount is even smaller (2.4375). On average positive mood subjects return 32.51 ( $sd=26.75$ ) and neutral mood participants choose to return 30.07 ( $sd=25.37$ ). Table 3.3 shows simple regression results that show that mood does not significantly affect offers or returns in the trust game. However, beliefs are highly significant. Here as well, belief is the dominant factor, the more you expect the partner to return, the more you send to the partner. The results are not that surprising when we consider the specific design in our experiments. Since the participant's are not aware of their own endowment or their partner's endowment, this creates extra ambiguity in the scenario. It is possible that due to ambiguity the effect of mood is eroded and belief-which is more inherent and possibly formed by other factors, has a stronger effect. The effect of belief overpowers the effects of mood.

**Result 3:** *There is no effect of positive mood in offers and returns made in the trust game.*

Finally, we test for cognitive intelligence using the GMAT questions. Figure

3.6 shows that participants in positive mood answer on average 80% of the GMAT questions correctly, compared to 67% answered by participants in neutral mood (p value 0.0054). This is consistent with the literature that finds, positive mood enhances problem solving and decision making, leading to cognitive processing that is not only flexible, innovative, and creative, but also thorough and efficient Isen (2001); Baumeister et al. (1998).

**Result 4:** *Mood affects cognition and participants in positive mood have higher cognitive intelligence.*

The main implication of our results is that mood has an effect on effort related task and cognitive related task. But has no effect on the decision to make contributions to the PG game or on reciprocity in the trust game. The result may seem surprising at first, but if we look closer an interesting pattern emerges. Both the real effort task and the cognitive intelligence test relied on individual's own self. There was no strategic element to these tasks. However the decision to either make a contribution or offer a positive amount to the partner is a strategic decision. It involves elements of uncertainty and in our special design an element of ambiguity. In this scenario, it is possible that the effect of positive mood is cancelled out by the existence of ambiguity in our study.

One possible mechanism through which mood affects cognition, which is required for both effort task and GMAT test is that, there is reduced cognitive load under positive mood so it is possible for subjects in positive mood to engage in more deliberate thinking and make decisions more efficiently. Unfortunately, we cannot directly test for this in our study. All participants had a fixed amount of time to complete the effort task and we did not have a time record for the cognitive test. But we can check for response time in the two mood conditions across all decisions in the PG game and trust game. Table 3.4 shows the mean response time measured in seconds. Simple t-test results reveal there is no significant difference in the response times and this pattern is consistent through out the three decisions. This could be

another reason why we do not see any effect of mood on these decisions, perhaps the effect of mood on processing strategy fades away under ambiguity.

### 3.5 Conclusions

In this paper we test the multiple motive idea to see how mood, risk and belief affect strategic interactions across different games. We use a combination of Velten and Music MIP to induce positive or neutral mood in subjects. Risk perceptions are measured using the DOSPERT 30-item and an additional social risk question. Belief was elicited by asking participants to state the likelihood of their partner's actions. A real-effort task was used to allow participants to earn their initial endowments. Participants were also asked to play a one shot PG game and a one shot trust game, followed by a cognition test using GMAT questions.

We find that people in positive mood put in more effort compared to people in neutral mood and perform better in the cognitive intelligence test. However, we find that mood in presence of ambiguity is overpowered by beliefs and decisions in public goods game and trust games are driven mostly by belief rather than participant's mood. The most significant motivation in choosing how much to contribute or how much to offer in the trust game is- belief, with a positive relationship seen between a participants beliefs about their partners contribution and their own contribution. These results are also in line with the PG game research by Kocher et al. (2011) that similarly used incentives to elicit beliefs and found the same relationship between beliefs and contribution. Most participants cooperate if they believe their partner wants to cooperate too, with their contribution depending on how optimistic they are about their partners contribution (Fischbacher et al., 2001).

One reason why we do not find effect of mood on the strategic games could be because there is increased ambiguity here, as participants do not know the size of their own and their partners endowments. It is possible that uncertainty and the

associated risk may become a more important factor in decision-making. Additionally, participants earned their endowments in a real-effort task rather than receiving them from the experimenter, if people regard their endowment as compensation for their effort this could make the financial risk of contribution more salient. The main implication from this paper is that mood affects decision making, but only when the decision structure is unambiguous and non-strategic. In presence of ambiguity, the effect of mood is overpowered by other motivation, for example expectations. This paper opens up possibility for future research to examine under what environment positive mood has a causal effect on decision making process.

Table 3.1: Differences in demographic characteristics across mood

Variable	Neutral	Positive	Differences	Std. dev	N
Age	23.7656	21.3281	2.4375**	5.8938	128
Female	0.5937	0.5937	0	0.4930	128
Year of study	2.6406	2.4062	0.2343	1.4633	128
Native English	0.4062	0.375	0.0312	0.3049	128

\*( $p < 0.10$ ), \*\* ( $p < 0.05$ ), \*\*\* ( $p < 0.01$ )

Figure 3.1: The self reported mood of the participants

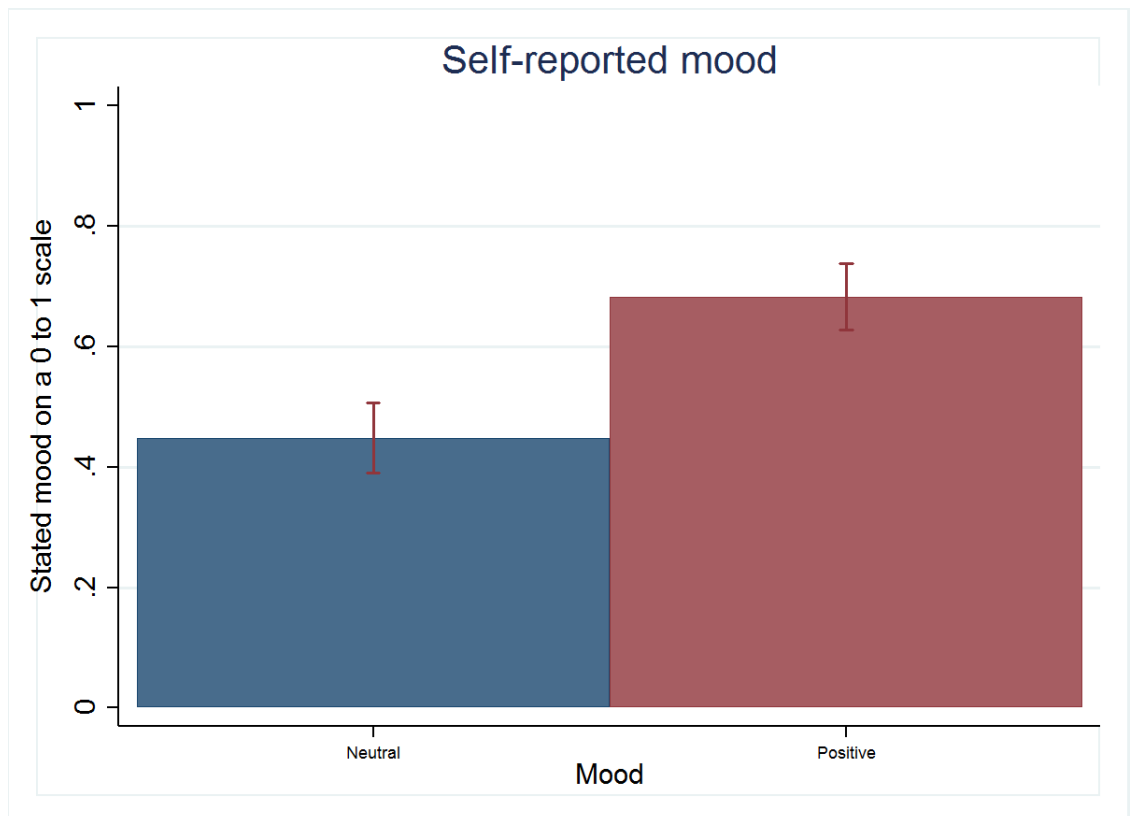


Figure 3.2: The correct encryptions in real effort task

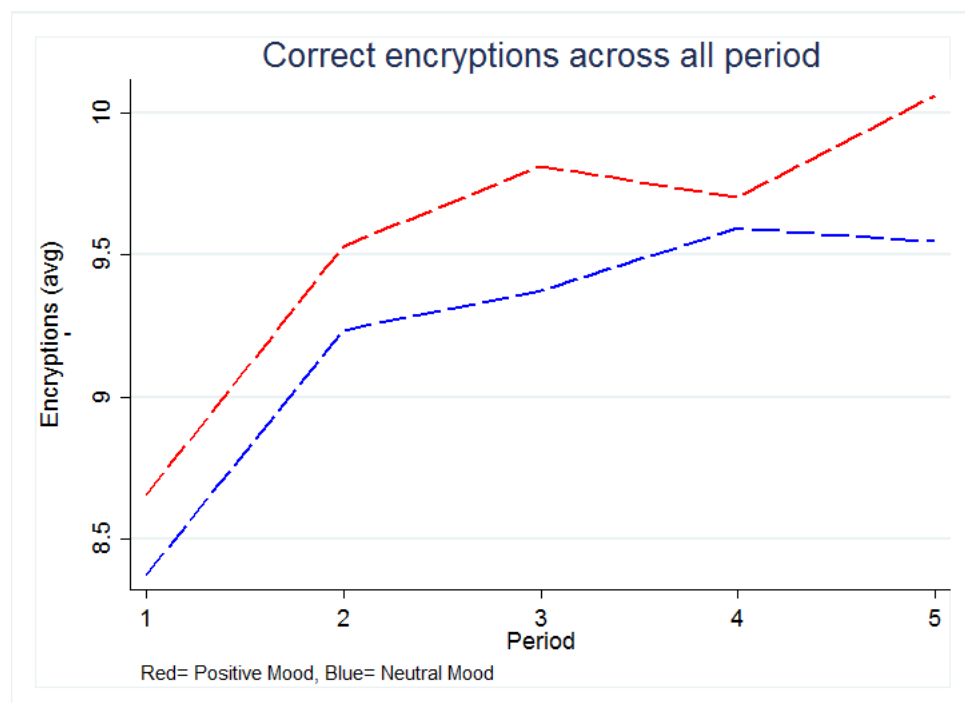




Figure 3.3: The average contribution in the 2-person Public Goods Game.

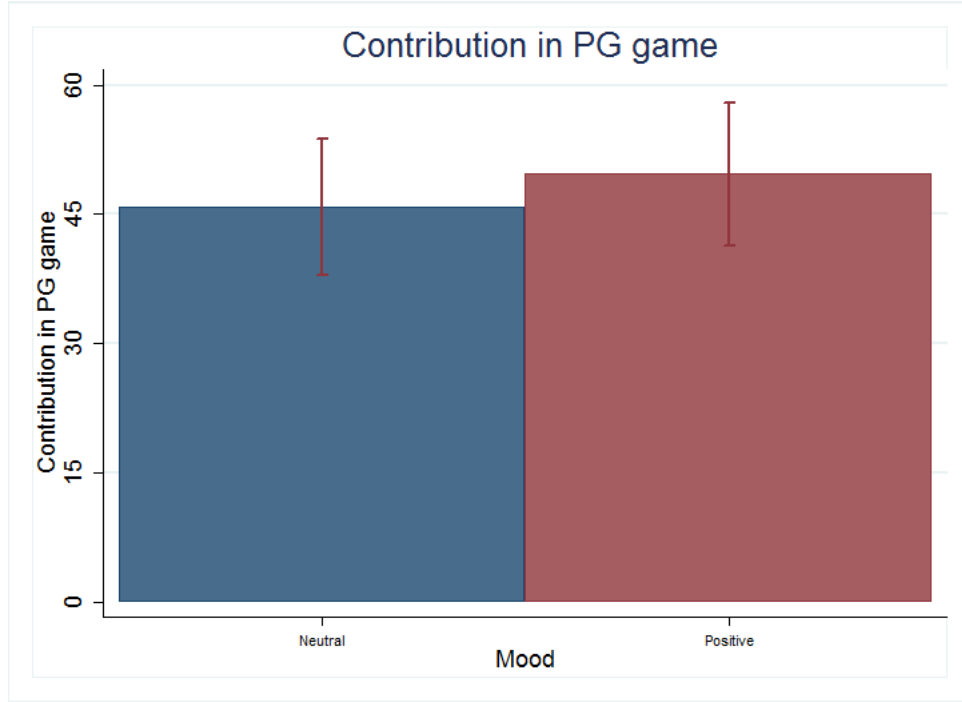


Table 3.2: Regression estimation for contribution in PG game

	Contribution M1 b/p	Contribution M2 b/p
Positive Mood	1.50406 (0.6723)	-21.78630* (0.0545)
Social Risk Aversion	-12.15635 (0.1466)	-23.11043** (0.0169)
Positive Mood Risk Aversion		25.67589** (0.0277)
Belief	1.06908*** (0.0000)	1.05417*** (0.0000)
N	128	128

Figure 3.4: The average offer in the 2-person Gift Exchange Game.

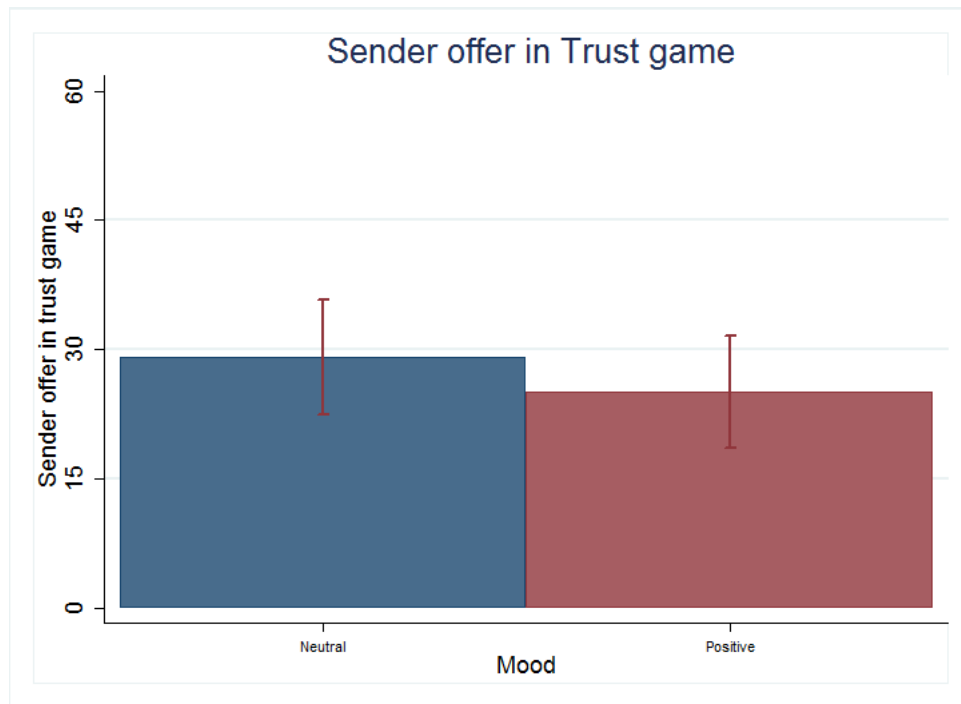


Figure 3.5: The average return in the 2-person Gift Exchange Game.

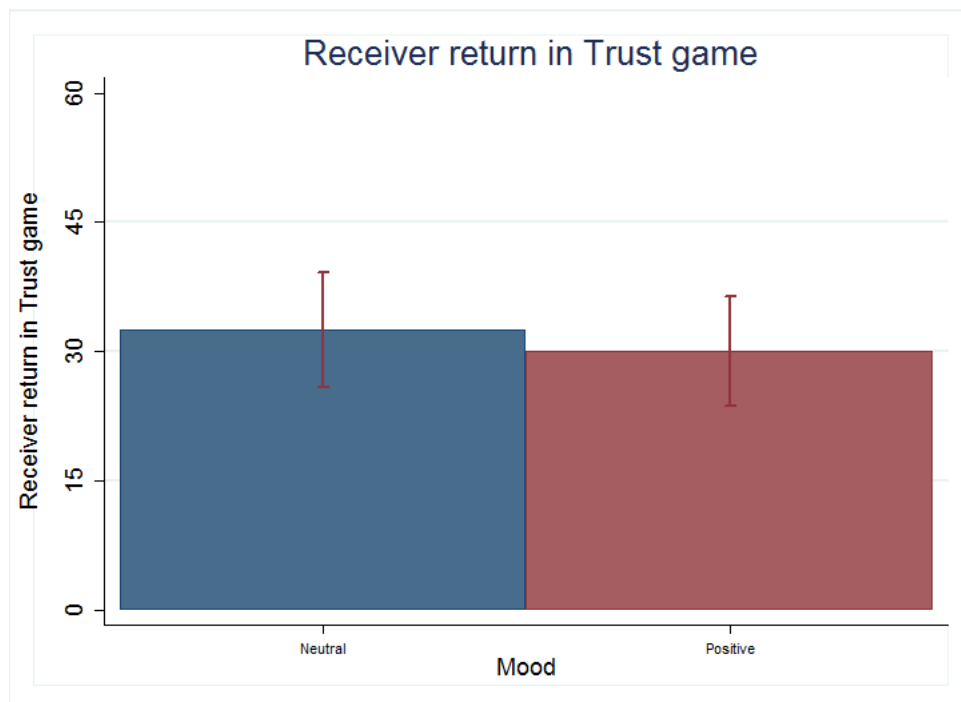


Table 3.3: Regression estimation in the Trust game

	Offer M1 b/p	Offer M2 b/p	Reurn M3 b/p	Return M4 b/p
Positive Mood	-0.05053 (0.9933)	-15.53900 (0.4077)	-1.13550 (0.8153)	-1.98354 (0.7957)
Risk Aversion	-13.22053 (0.1536)	-20.58345 (0.1000)	-8.94422 (0.2522)	-4.86903 (0.5136)
Positive Mood Risk Averse		17.00567 (0.3300)		-0.62026 (0.9427)
Belief	0.68919*** (0.0004)	0.68139*** (0.0004)		
Belief			0.68884*** (0.0003)	0.95494*** (0.0000)
N	128	128	128	128

Figure 3.6: The average score on 5 GMAT questions

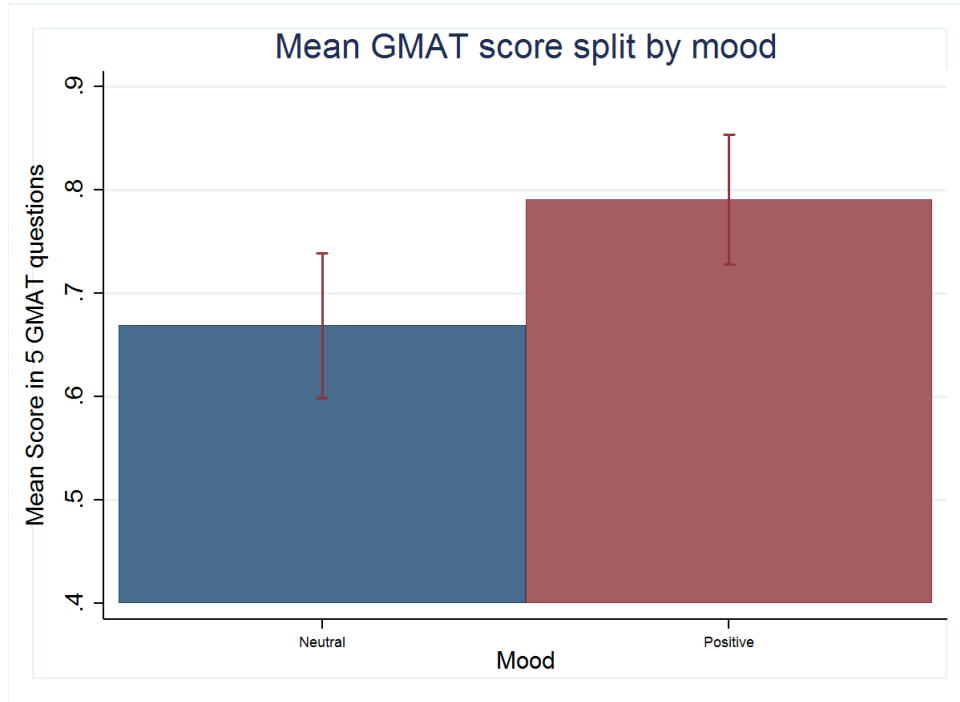


Table 3.4: Differences in response time (seconds) across mood

	Neutral	Positive	Differences	Std. dev	N
PG game	13.82813	13.8125	0.15625	12.96964	128
Sender	7.59375	8.890625	-1.296875	6.556533	128
Receiver	9.109375	10.82813	-1.71875	9.25912	128

\*( $p < 0.10$ ), \*\* ( $p < 0.05$ ), \*\*\* ( $p < 0.01$ )

# Bibliography

- Arkes, H. R., Joyner, C. A., Pezzo, M. V., Nash, J. G., Siegel-Jacobs, K. and Stone, E. (1994). The psychology of windfall gains, *Organizational Behavior and Human Decision Processes* **59**(3): 331–347.
- Ashraf, N., Bohnet, I. and Piankov, N. (2006). Decomposing trust and trustworthiness, *Experimental economics* **9**(3): 193–208.
- Balliet, D. (2010). Communication and cooperation in social dilemmas: A meta-analytic review, *Journal of Conflict Resolution* **54**(1): 39–57.
- Baumeister, R. F., Bratslavsky, E., Muraven, M. and Tice, D. M. (1998). Ego depletion: is the active self a limited resource?, *Journal of personality and social psychology* **74**(5): 1252.
- Baumeister, R. F., DeWall, C. N. and Zhang, L. (2007). Do emotions improve or hinder the decision making process, in R. F. B. Kathleen D. Vohs and G. Loewenstein (eds), *Do Emotions Help or Hurt Decisionmaking*, Russell Sage Foundation, chapter 1, pp. 11–32.
- Benjamin, D. J., Choi, J. J. and Strickland, A. J. (2007). Social identity and preferences, *Technical report*, National Bureau of Economic Research.
- Berg, J., Dickhaut, J. and McCabe, K. (1995). Trust, reciprocity, and social history, *Games and economic behavior* **10**(1): 122–142.

- Blais, A.-R. and Weber, E. U. (2006). A domain-specific risk-taking (dospert) scale for adult populations, *Judgment and Decision Making* **1**(1).
- Bohnet, I. and Zeckhauser, R. (2004). Trust, risk and betrayal, *Journal of Economic Behavior & Organization* **55**(4): 467–484.
- Bower, G. H. (1981). Mood and memory., *American psychologist* **36**(2): 129.
- Capra, C. M. (2004). Mood-driven behavior in strategic interactions, *The American Economic Review* **94**(2): 367–372.
- Cherry, T. L., Kroll, S. and Shogren, J. F. (2005). The impact of endowment heterogeneity and origin on public good contributions: evidence from the lab, *Journal of Economic Behavior & Organization* **57**(3): 357–365.
- Croson, R. and Gneezy, U. (2009). Gender differences in preferences, *Journal of Economic literature* **47**(2): 448–474.
- Cubitt, R. P., Gaechter, S. and Quercia, S. (2015). Conditional cooperation and betrayal aversion.
- Dal Bó, P. (2005). Cooperation under the shadow of the future: experimental evidence from infinitely repeated games, *The American Economic Review* **95**(5): 1591–1604.
- Dal Bó, P. and Fréchette, G. R. (2011). The evolution of cooperation in infinitely repeated games: Experimental evidence, *American Economic Review* **101**(1): 411–429.
- Dal Bó, P. and Fréchette, G. R. (2014). On the determinants of cooperation in infinitely repeated games: A survey, *Available at SSRN 2535963* .
- Damasio, A. (1994). *Descartes Error: Emotion, Reason, and the Human Brain*, Grosset Putnam New York.

- Davis, D., Ivanov, A. and Korenok, O. (2016). Individual characteristics and behavior in repeated games: an experimental study, *Experimental Economics* **19**(1): 67–99.
- Drichoutis, A. C. and Nayga, R. M. (2013). Eliciting risk and time preferences under induced mood states, *The Journal of Socio-Economics* **45**: 18–27.
- Drouvelis, M. and Grosskopf, B. (2016). The effects of induced emotions on pro-social behaviour, *Journal of Public Economics* .
- Drouvelis, M. and Powdthavee, N. (2015). Are happier people less judgmental of other people’s selfish behaviors? experimental survey evidence from trust and gift exchange games, *Journal of Behavioral and Experimental Economics* **58**: 111–123.
- Dunn, J. R. and Schweitzer, M. E. (2005). Feeling and believing: the influence of emotion on trust., *Journal of personality and social psychology* **88**(5): 736.
- Eagly, A. H., Wood, W. and Diekmann, A. B. (2000). Social role theory of sex differences and similarities: A current appraisal, *The developmental social psychology of gender* pp. 123–174.
- Eckel, C. C. and Grossman, P. J. (2008). Differences in the economic decisions of men and women: Experimental evidence, *Handbook of experimental economics results* **1**: 509–519.
- Embrey, M., Fréchette, G. R. and Yuksel, S. (2014). Cooperation in the finitely repeated prisoners dilemma, *Technical report*, Working Paper.
- Embrey, M., Fréchette, G. R. and Yuksel, S. (2015). Cooperation in the finitely repeated prisoner’s dilemma, *Available at SSRN 2743269* .
- Engel, C. and Zhurakhovska, L. (2016). When is the risk of cooperation worth taking? the prisoners dilemma as a game of multiple motives, *Applied Economics Letters* pp. 1–5.

- Fischbacher, U. (2007). z-tree: Zurich toolbox for ready-made economic experiments, *Experimental economics* **10**(2): 171–178.
- Fischbacher, U., Gächter, S. and Fehr, E. (2001). Are people conditionally cooperative? evidence from a public goods experiment, *Economics letters* **71**(3): 397–404.
- Fischer, A. H., Manstead, A. S. et al. (2008). Social functions of emotion, *Handbook of Emotions* **3**: 456–468.
- Flood, M. M. (1952). Some experimental games, *Research Memorandum RM-789, The Rand Corporation, Santa Monica* .
- Forgas, J. P. (1998). On feeling good and getting your way: Mood effects on negotiator cognition and bargaining strategies, *Journal of Personality and Social Psychology* **74**(3): 565–577.
- Forgas, J. P. (2002). Feeling and doing: Affective influences on interpersonal behavior, *Psychological Inquiry* **13**(1): 1–28.
- Frank, R. H. (1988). *Passions within reason: the strategic role of the emotions.*, WW Norton & Co.
- Frijda, N. H. and Mesquita, B. (1994). The social roles and functions of emotions, in S. Kitayama and H. R. Markus (eds), *Emotion and Culture: Empirical Studies of Mutual Influence*, American Psychological Association, chapter 3, pp. 51–87.
- Fudenberg, D. and Tirole, J. (1991). *Game Theory*, Cambridge, Massachusetts.
- García-Gallego, A., Georgantzís, N. and Jaramillo-Gutiérrez, A. (2012). Gender differences in ultimatum games: Despite rather than due to risk attitudes, *Journal of Economic Behavior & Organization* **83**(1): 42–49.
- Gill, D. and Prowse, V. (2016). Cognitive ability, character skills, and learning to play equilibrium: A level-k analysis, *Journal of Political Economy* **124**(6): 1619–1676.



- Gneezy, U., Niederle, M., Rustichini, A. et al. (2003). Performance in competitive environments: Gender differences, *QUARTERLY JOURNAL OF ECONOMICS-CAMBRIDGE MASSACHUSETTS*- **118**(3): 1049–1074.
- Gneezy, U. and Rustichini, A. (2000). Pay enough or don't pay at all, *Quarterly journal of economics* pp. 791–810.
- Guiso, L., Sapienza, P. and Zingales, L. (2013). Time varying risk aversion, *Technical report*, National Bureau of Economic Research.
- Güth, W. and Kocher, M. G. (2014). More than thirty years of ultimatum bargaining experiments: Motives, variations, and a survey of the recent literature, *Journal of Economic Behavior & Organization* **108**: 396–409.
- Güth, W., Schmittberger, R. and Schwarze, B. (1982). An experimental analysis of ultimatum bargaining, *Journal of economic behavior & organization* **3**(4): 367–388.
- Hertel, G., Neuhof, J., Theuer, T. and Kerr, N. L. (2000). Mood effects on cooperation in small groups: Does positive mood simply lead to more cooperation?, *Cognition & emotion* **14**(4): 441–472.
- Holm, H. J. (2000). Gender-based focal points, *Games and Economic Behavior* **32**(2): 292–314.
- Ifcher, J. and Zarghamee, H. (2014). Affect and overconfidence: A laboratory investigation., *Journal of Neuroscience, Psychology, and Economics* **7**(3): 125.
- Isen, A. M. (2001). An influence of positive affect on decision making in complex situations: Theoretical issues with practical implications, *Journal of consumer psychology* **11**(2): 75–85.
- Isen, A. M. and Geva, N. (1987). The influence of positive affect on acceptable level

- of risk: The person with a large canoe has a large worry, *Organizational Behavior and Human Decision Processes* **39**(2): 145–154.
- Isen, A. M. and Gorgoglione, J. M. (1983). Some specific effects of four affect-induction procedures, *Personality and Social Psychology Bulletin* **9**(1): 136–143.
- John, O. P. and Srivastava, S. (1999). The big five trait taxonomy: History, measurement, and theoretical perspectives, *Handbook of personality: Theory and research* **2**(1999): 102–138.
- Kessler, J. B., McCellan, A. and Schotter, A. (2016). Mood and economic decision making: Experimental evidence, *Technical report*.
- Kirchsteiger, G., Rigotti, L. and Rustichini, A. (2006). Your morals might be your moods, *Journal of Economic Behavior & Organization* **59**(2): 155–172.
- Kocher, M. G., Martinsson, P., Matzat, D. and Wollbrant, C. (2011). The role of beliefs, trust, and risk in contributions to a public good.
- Kray, L. J. and Thompson, L. (2004). Gender stereotypes and negotiation performance: An examination of theory and research, *Research in organizational behavior* **26**: 103–182.
- Ledyard, J. et al. (1997). Public goods: A survey of experimental research, *Technical report*, David K. Levine.
- Lerner, J. S. and Keltner, D. (2001). Fear, anger, and risk., *Journal of personality and social psychology* **81**(1): 146.
- Loewenstein, G. and Issacharoff, S. (1994). Source dependence in the valuation of objects, *Journal of Behavioral Decision Making* **7**(3): 157–168.
- Lount Jr, R. B. (2010). The impact of positive mood on trust in interpersonal and intergroup interactions., *Journal of personality and social psychology* **98**(3): 420.

- Marchetti, A., Castelli, I., Harlé, K. M. and Sanfey, A. G. (2011). Expectations and outcome: The role of proposer features in the ultimatum game, *Journal of economic psychology* **32**(3): 446–449.
- Muehlbacher, S. and Kirchler, E. (2009). Origin of endowments in public good games: The impact of effort on contributions., *Journal of Neuroscience, Psychology, and Economics* **2**(1): 59.
- Oosterbeek, H., Sloof, R. and Van De Kuilen, G. (2004). Cultural differences in ultimatum game experiments: Evidence from a meta-analysis, *Experimental Economics* **7**(2): 171–188.
- Oswald, A. J., Proto, E. and Sgroi, D. (2009). Happiness and productivity.
- Oswald, A. J., Proto, E. and Sgroi, D. (2015). Happiness and productivity, *Journal of Labor Economics* **33**(4): 789–822.
- Oxoby, R. J. and Spraggon, J. (2006). A clear and present minority: Heterogeneity in the source of endowments and the provision of public goods, *Institute for Advanced Policy Research working paper* .
- Pennebaker, J. W., Francis, M. E. and Booth, R. J. (2001). Linguistic inquiry and word count: Liwc 2001, *Mahway: Lawrence Erlbaum Associates* **71**(2001): 2001.
- Proto, E., Rustichini, A. and Sofianos, A. (2014). Higher intelligence groups have higher cooperation rates in the repeated prisoner’s dilemma.
- Pyone, J. S. and Isen, A. M. (2011). Positive affect, intertemporal choice, and levels of thinking: Increasing consumers’ willingness to wait, *Journal of Marketing Research* **48**(3): 532–543.
- Ralph, A. and Damasio, A. R. (2000). The interaction of affect and cognition: A neurobiological perspective, *Handbook of Affect and Social Cognition*, Routledge, chapter 2.

- Rand, D. G., Greene, J. D. and Nowak, M. A. (2012). Spontaneous giving and calculated greed, *Nature* **489**(7416): 427–430.
- Raven, J. et al. (2003). Raven progressive matrices, *Handbook of nonverbal assessment*, Springer, pp. 223–237.
- Robinson, M. D. and Clore, G. L. (2002). Belief and feeling: evidence for an accessibility model of emotional self-report., *Psychological bulletin* **128**(6): 934.
- Saad, G. and Gill, T. (2001). Sex differences in the ultimatum game: An evolutionary psychology perspective, *Journal of Bioeconomics* **3**(2-3): 171–193.
- Sabater-Grande, G. and Georgantzis, N. (2002). Accounting for risk aversion in repeated prisoners dilemma games: An experimental test, *Journal of economic behavior & organization* **48**(1): 37–50.
- Sally, D. (1995). Conversation and cooperation in social dilemmas a meta-analysis of experiments from 1958 to 1992, *Rationality and society* **7**(1): 58–92.
- Schwarz, N. (2013). Feelings as information: Implications for affective influences on information processing, in L. L. Martin and G. L. Clore (eds), *Theories of Mood and Cognition: A User's Handbook*, Psychology Press, chapter 7, pp. 159–176.
- Solnick, S. J. (2001). Gender differences in the ultimatum game, *Economic Inquiry* **39**(2): 189.
- Sutter, M., Bosman, R., Kocher, M. G. and van Winden, F. (2009). Gender pairing and bargaining beware the same sex!, *Experimental Economics* **12**(3): 318–331.
- Thöni, C., Tyran, J.-R. and Wengström, E. (2012). Microfoundations of social capital, *Journal of Public Economics* **96**(7): 635–643.
- Västfjäll, D. (2002). Emotion induction through music: A review of the musical mood induction procedure, *Musicae Scientiae* **5**(1 suppl): 173–211.

- Velten, E. (1968). A laboratory task for induction of mood states, *Behaviour research and therapy* **6**(4): 473–482.
- Westermann, R., Spies, K., Stahl, G. and Hesse, F. W. (1996). Relative effectiveness and validity of mood induction procedures: a meta-analysis, *European Journal of Social Psychology* **26**(4): 557–580.
- Wilkinson, N. and Klaes, M. (2012). *An introduction to behavioral economics*, Palgrave Macmillan.

# Appendices

## A Chapter 1: Advertisement for study participation



### Students Needed For a Study in Economics

#### EARN UP TO BDT 750 FOR ONE HOUR OF YOUR TIME

- Sign up to take part in an economic experiment conducted by University of Warwick, UK in association with BRAC University.
- You can earn up to 750 Bangladeshi Taka (BDT) to take part in the research where you will be required to perform some very basic tasks in front of a computer for no more than one hour. This includes 250 BDT as show-up fee (just for participating). There are no further obligations and you may choose the time you would like to come to take part in the study. The time period is as follows:

2 August Sunday	4 August Tuesday	6 August Thursday	Room
9:30- 11:00	9:30- 11:00	9:30- 11:00	Building 4 Architecture and ESS Lab
11:00-12:30	11:00-12:30	11:00-12:30	
12:30-2:00	12:30-2:00		
2:00-3:30	2:00-3:30		
3:30-5:00	3:30-5:00		

- No Special Training, Education or Experience is needed. Anyone can take part.
- If you are interested please contact Mahnaz Nazneen (email: [m.nazneen@warwick.ac.uk](mailto:m.nazneen@warwick.ac.uk)). Please provide your **full name** and **mobile number** in the email and specify your preferred time slot. You will be contacted for confirmation of your participation. *We reserve the right to decline an application.*

## B Chapter 1: Experiment Dates

Date	Day	Session	Total Session	Treatment	Participants
02/08/2015	1	1	1	Control	20
		2	2	Treatment	20
		3	3	Control	20
		4	4	Treatment	14
		5	5	Control	14
04/08/2015	2	1	6	Treatment	20
		2	7	Control	20
		3	8	Treatment	20
		4	9	Control	20
		5	10	Treatment	20
06/08/2015	3	1	11	Control	14
		2	12	Treatment	20
				Total	222

## C Chapter 1: Picture of the laboratory





## **D Chapter 1: Experiment Instructions**

Good morning/afternoon and thank you for coming to participate in our economic experiment. This may be the first time many of you are participating in a session like this, so please feel free to ask questions. Before we begin, please check that the number on the card handed to you matches with the number on the computer that you are seated in. Also please make sure that you have read the information sheet provided and signed the consent form. A couple of general rules of such experiments:

- Please do not communicate with each other at any point. Unfortunately if you do so, we will have to cancel your participation and the whole session will be cancelled. If you have any questions, raise your hand and the experimenter will come and answer your question.
- Also, please do not use your mobile phones during the experiment.

The next set of instructions will come up on your computer screens. We will now begin the experiment.

### **Start General Instructions**

By carefully reading the following instructions, you can depending on your decisions earn money in addition to the show-up fee of Tk. 250 taka. It is, therefore, of importance that you accurately read these instructions. The amount of money you earn in the task is called your payoff. During the whole experiment communication with other participants is not allowed. Therefore, we ask you to not speak with each other. If you do not understand something, please ask the experimenter by raising your hand. We will come to your place and answer your question individually.

Also bear in mind that you may have to wait few moments during the experiment, as we want everyone to finish at the same time. You will see the message Please, wait. on your screen when this is applicable. Today's experiment consists of the following: In the first part, you will be asked to answer some questions about yourself. In the second part, you will complete a decision making task. In the third

part you will take part in a visual puzzle. And finally there will be some questions for you to answer. Detailed instructions for each part will follow.

### **Start Questionnaire: Demographic questions**

In this part you will read a small paragraph about a topic. Please read the text carefully.

*Decades of research in experimental economics has shown that preferences of individuals and their economic behaviour are quite heterogeneous. The literature has attempted to explain this heterogeneity due to different factors such as age, educational background, cultural differences, income levels and social status, among others. One of the most important factors that has been analyzed thoroughly is the role of gender in economic behaviour. Recent surveys which review the literature on gender differences in experimental economics have found that, women tend to be more generous and demonstrate a fairer approach towards distribution of wealth when compared to men of similar background. For example, authors Guth, Schimdt and Sutter (2007) find that female participants are significantly more likely to offer equal splits of a pie or sum of money than are men, and suggest this is because women are averse to the idea of inequality.*

### **Start Paragraph and UG**

In this task, each of you will be randomly matched with someone in this room to make decisions; we call the randomly matched person your partner. You and your partner will play the role of either a Proposer (P), or a Responder (R). The computer will randomly assign you to one of these roles. However, no participant will ever know the identity of the person they are partnered with, everything will remain anonymous. In the task, the role of the Proposer (P) is to propose a distribution of Tk. 500 between P and R. The role of R is to state the minimum amount of money that he/she is willing to accept from P, we call this the Minimum Acceptable Offer (MAO). If the offer made by P is greater or equal to the MAO of the R, each player gets the amount proposed by the Proposer. If the offer made by P is less than the

MAO of R, both players (P and R) get 0.

For example:

"If P offers Tk X and Rs MAO is Tk. Y then,

Ps pay-off is Tk.  $(500 - X)$  and Rs payoff is Tk. X ; if  $X \geq Y$

Ps pay-off is Tk. 0 and Rs payoff is Tk. 0 if  $X < Y$

### **Start Raven**

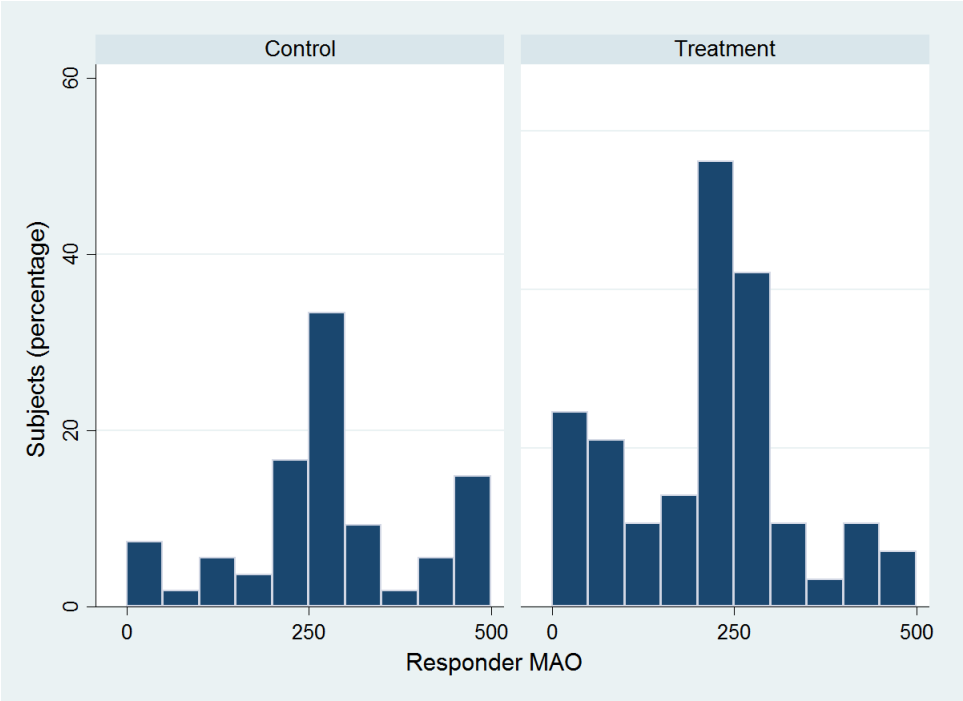
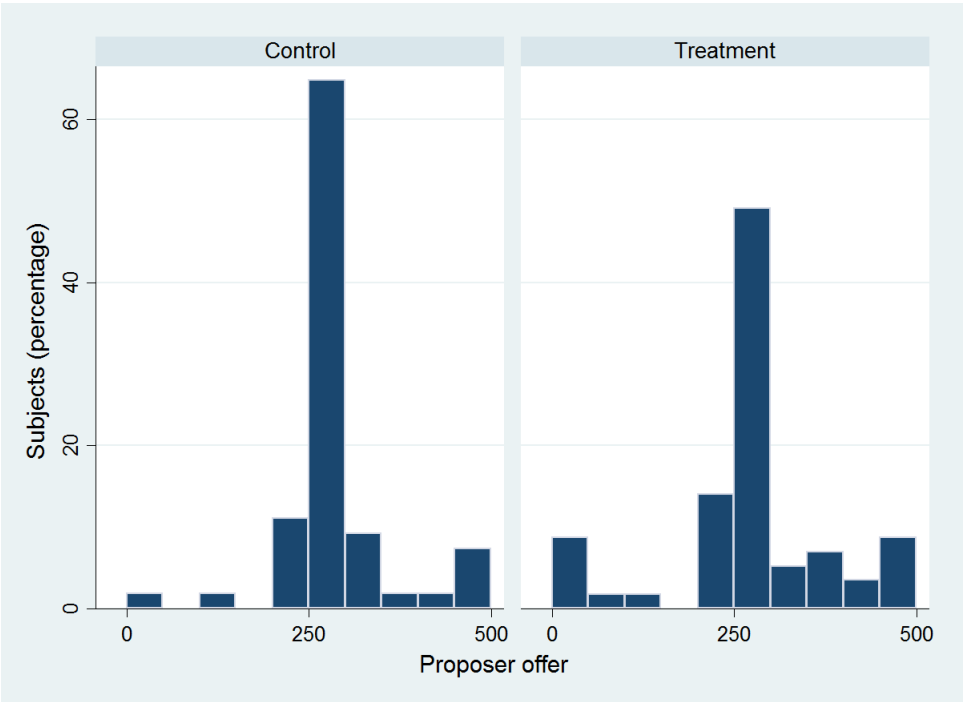
You will now perform a visual puzzle. There will be 30 puzzles for you to solve. Your score in this puzzle will be given to you at the end of the experiment while you receive your payment. You will see an example on your screen before you begin.

### **Start Final Questionnaire**

Thank you. Now you will answer some questions about yourself, while we calculate your payoff from today's experiment. In the first part of the experiment you will be asked to answer some questions about yourself. Questionnaire

- Personal Information (Open ended): age, year of study, high school grade, current degree course
- Categorical questions: gender, degree course, year of study, mode of instruction in high school, social distance, life satisfaction
- Risk (DOSPERT 30 items questions)

E Chapter 1: Histogram of offers



## F Chapter 2: Experiment Dates

Date	Total Sessions	Mood	Chat	Repeated	Belief	Participants
12/06/15	1	Happy	Yes	Infinite	No	18
	2	Neutral	Yes	Infinite	No	18
15/06/15	3	Happy	Yes	Infinite	No	14
	4	Neutral	Yes	Infinite	No	20
	5	Happy	Yes	Infinite	No	14
16/06/15	6	Neutral	Yes	Infinite	No	16
	7	Happy	Yes	Infinite	No	16
10/02/16	8	Happy	Yes	Finite	No	18
	9	Neutral	Yes	Finite	No	18
	10	Happy	Yes	Finite	No	20
	11	Neutral	Yes	Finite	No	18
11/02/16	12	Neutral	Yes	Finite	No	16
	13	Happy	Yes	Finite	No	18
	14	Neutral	No	Finite	No	18
	15	Happy	No	Finite	No	18
15/02/16	16	Happy	No	Finite	No	16
	17	Neutral	No	Finite	No	16
16/02/16	18	Happy	No	Finite	No	18
	19	Neutral	No	Finite	No	18
15/03/16	20	Happy	Yes	Finite	Yes	16
	21	Neutral	Yes	Finite	Yes	18
	22	Happy	No	Finite	Yes	18
16/03/16	23	Neutral	No	Finite	Yes	14
	24	Happy	Yes	Infinite	Yes	16
	25	Neutral	Yes	Infinite	Yes	18
17/03/16	26	Happy	No	Infinite	No	18
	27	Neutral	No	Infinite	No	20
26/05/16	28	Neutral	Yes	Infinite	No	18
27/05/16	29	Happy	Yes	Finite	Yes	16
	30	Neutral	Yes	Finite	Yes	18
01/06/16	31	Happy	Yes	Finite	Yes	16
	32	Neutral	Yes	Finite	Yes	18
					Total	552

## **G Chapter 2: Experiment Instructions**

Good morning and thank you for coming to participate in our economic experiment. Before we begin, can you please confirm that the number on the card handed to you while coming in matches with the number on the cubicle that you are seated in. Just a few points before we begin:

1. Please read all the instructions carefully, there are 3 parts of the experiment and detailed instructions for each part will be coming on your screen.
2. In the first part, you will be asked to read some simple statements while listening to an audio track. You have been provided with headphones for this part of the experiment, you will need this only for the first part of the experiment, so you can keep it aside after that. Try turning the volume in your headphones to maximum if you cannot hear properly.
3. In the second part, you will take part in decision tasks and your payoff will be based on your performance in these tasks. You will be paid for one of these tasks, randomly chosen.
4. In the third and final part there will be some questions for you to answer.
5. Please do not talk to each other at any point, if you have any questions, raise your hand and the experimenter will come to you.
6. Also bear in mind that you may have to wait few moments during the experiment, as we want everyone to finish at the same time, you will see the message *Please wait* on your screen when this is applicable.
7. Any questions? We will now begin the first part of the experiment.

### **Start Mood Induction- Happy**

In the first part of this experiment, you will be shown a series of screens with statements typed on them and you will hear some music in the background. The

success of this part of the experiment will largely depend on your willingness to be receptive and responsive to the idea in each statement, and to allow each idea to act upon you without interference. These ideas are called suggestions.

First, as each statement appears, you will simply read it to yourself, then go over each statement again in your head with the determination and willingness to really believe it. You will try to experience each idea, you will concentrate your full attention on it and exclude other ideas which are unrelated to the mood; like, "I'll see if this will work." Following these statements, there will be a brief series of simple tasks to perform, and following those, there will be a brief questionnaire that you will have to answer.

### **Start PD 1**

For this part of the experiment I will explain the task on the board, please feel free to ask any questions you might have. You will also see instructions on your screen. In this task, each of you will be randomly matched with someone in this room to make decisions in several rounds. On your screen you will see a similar screen like what is shown on the board. The computer will ask you to make a choice between C and D. Your payoff will be presented on the left table and your partner's payoff will be presented on the right table. In each table, your decisions (C or D) are represented in the rows and your partner's decisions are represented in the columns. The payoffs of each round will depend on both your decisions as well as your partner's.

For example, according to the table:

"If you choose C and your partner chooses C, your payoff will be 51 and your partner's payoff will be 51."

"If you choose D and your partner chooses C, your payoff will be 63 and your partner's payoff will be 22."

"If you choose C and your partner chooses D, your payoff will be 22 and your partner's payoff will be 63."

"And finally, if you choose D and your partner chooses D, your payoff will be 39

and your partner's payoff will be 39."

The payoffs you see in the table are in experimental units. Each unit corresponds to 30 pence. This task will be repeated for at exactly 11 rounds (at least 10 rounds-for infinite treatment). You will be paid for one if these rounds, chosen randomly by the computer. Just before you play this we will allow you to chat with your partner (only for sessions with communication). Just remember to not mention your identities, if we see your names or computer ID no we will have to cancel your responses from the chat. So feel free to talk about anything (non-abusive!) and no identities.

### **Start PD 2**

Thank you for completing the task successfully! You will now be randomly matched with *a different person* in the room. You will now complete the same task with your new partner, that is, you will chat with your partner for 3 minutes in an anonymous and non-abusive manner(only in communication treatment), followed by playing the same game exactly 11 rounds (at least 10 rounds).

### **Start PD 3**

Thank you for completing the task successfully! You will now be randomly matched with *another different person* in the room. You will now complete the same task with your new partner, that is, you will chat with your partner for 3 minutes in an anonymous and non-abusive manner(only in communication treatment), followed by playing the same game exactly 11 rounds (at least 10 rounds).This is the last time you will play this. We will then proceed to a different task.

### **Start RAVEN**

You will now perform a visual puzzle. There will be 30 puzzles for you to solve. You will be paid for three randomly selected correct answers, so you can earn up to 3 in this task. You will see an example on your screen before you begin.

### **Start Questionnaire**

Thank you. Now you will answer some questions about yourself, while we calculate



your payoff from today's experiment.

- How old are you?
- What is your year of study?
- What is your gender?
- What is your country of origin?
- Is English your native language?
- In high school, what was the highest possible mark?
- What is your current degree course?
- Would you consider your degree course mostly quantitative or qualitative?
- Personality Questions (Big Five 120 questions)
- Risk preference questions (DOSPERT 30 item )
- Please recall and describe how you felt (your mood) after reading the statements and listening to music at the beginning of the experiment. (5 item Likert scale, Very happy - Not at all happy)
- How dissatisfied or satisfied are you with your life in general? (7 item Likert scale; Not satisfied at all - Completely satisfied)

## H Chapter 2: Basin of Attraction Computations

The following appendix describes the computations required to calculate the basin of attraction probabilities, following Dal Bó and Fréchette (2011). When calculating their best response, each player must consider the probability that their rival plays cooperate or defect. This probability will give rise to a stream of payoffs for a given strategy, and then strategies can be compared to see which yields the higher payoff. There will be a threshold belief on the probability of their rival playing each action which makes a player indifferent and to each side of this threshold we can think about a basin of attraction as the set of beliefs for which a particular strategy is optimal. The details of the game can be found in table A.1.

Lets consider the more general stage game

Table A.1: Stage Game

	Cooperate	Defect
Cooperate	R, R	S, T
Defect	T,S	P, P

Where, following Dal Bó and Fréchette (2014), R is the cooperative reward, S is the “sucker” payoff, T is the “temptation” payoff, and P is the “punishment” payoff, with  $T > R > P > S$

### For the Finite Case (exactly $N_f = 11$ rounds)

The “grim” strategy involves an initial attempt to cooperate but an immediate response of defect, followed by defect thereafter for a number of rounds  $> 1$  if the other player is observed to defect at any point. In the “tit for tat” strategy, starting with cooperation the player punishes defect by the partner only for one period, then if the partner cooperates the player starts to cooperate again. We generally refer to these strategies as “sophisticated cooperation”. Finally the the strategy “always

defect” simply involves playing defect in all periods irrespective of the actions of the other player.<sup>10</sup>

Let’s assume that a player expects that the opponent to play “always defect” with a probability  $\tilde{p}$ , while she plays “sophisticated cooperation” with a probability  $1 - \tilde{p}$ . Note that playing “sophisticated cooperation” against “sophisticated cooperation” implies cooperation in every period until the end. Playing “sophisticated cooperation” against “always defect” implies earning  $S$  in the first period then the cooperation breaks down with a return of  $P$  until the end. Playing “always defect” against “sophisticated cooperation” implies earning  $T$  in the first period then the cooperation breaks down with a return of  $P$  until the end. Trivially, playing “always defect” against “always defect” implies that the couple never cooperate and earn  $P$  every period for the full duration of the game.

Hence the expected payoff from playing the “always defect” strategy in the finite case is given by the following expression:

$$\tilde{p}(N_f P) + (1 - \tilde{p})(T + (N_f - 1)P) \quad (1)$$

Intuitively, with probability  $\tilde{p}$  two defectors meet returning a payoff of  $P$  in every period, or with probability  $1 - \tilde{p}$  the “always defect” player meets a cooperator and so gains  $T$  initially before the other player switches to defect, generating  $P$  thereafter.

Similarly, the expected payoff from playing the “sophisticated cooperation” strategy is given by the following expression:

$$\tilde{p}(S + (N_f - 1)P) + (1 - \tilde{p})(N_f R) \quad (2)$$

Again, this is simply the probability  $\tilde{p}$  that a defector is met, yielding an initial payoff of  $S$  followed by  $P$  thereafter, and the probability  $1 - \tilde{p}$  that a cooperator

---

<sup>10</sup>Restricting attention to these strategies is reasonable from an empirical perspective, Dal Bó and Fréchette (2011) show that subjects play these strategies about 80% of time.

is met, yielding  $R$  for the full duration of the game.

The probability that makes the individual indifferent between playing “sophisticated cooperation” and “always defect”, denoted  $\bar{p}$ , that identifies the edge of the two basins of attraction can be calculated by equating terms 1 and 2:

$$\bar{p}(N_f P) + (1 - \bar{p})(T + (N_f - 1)P) = \bar{p}(S + (N_f - 1)P) + (1 - \bar{p})(N_f R) \quad (3)$$

or

$$\bar{p} = \frac{(N_f - 1)P - N_f R + T}{(N_f - 2)P - N_f R + S + T} \quad (4)$$

*So that it is optimal to play a sophisticated cooperation strategy iff  $\tilde{p} < \bar{p}$ .*

Note that  $\tilde{p}$  is a subjective probability.

Therefore we can define *subjects with better capacity of predicting partners’ move as the ones more likely to set  $\tilde{p}$  close to 1 if their partners choose “always defect”, and close to 0 their partners choose “sophisticated cooperation”.*

Substituting  $R = 51; T = 63; S = 22; P = 39; N_f = 11$ , we have that the numerical value of the threshold is

$$\bar{p} = 0.864$$

The accuracy in the calculation of  $\bar{p}$  depends on the computational capacity of the players, who may make mistakes in the calculation of the expected values of expression 1 and expression 2, or in the solution of equation 3. We call  $\epsilon_c$  a mistake in this calculation and we define *subjects with better computational capacity as the ones for which it is more likely that  $\epsilon_c = 0$ .*

Hence each individual estimates  $\tilde{p}(\epsilon_c)$ , where  $\epsilon_c$  is the computational error, such that  $\tilde{p}(0) = \bar{p}$ .

**For the Indefinite treatment (at least  $N_i = 10$  rounds)**

In the indefinite treatment, subjects play 10 rounds for sure, then they know that the supergame can terminate at anytime. Given that they do not have any other information, a rational individual would set the termination probability  $\tilde{\delta} = 0.5$  for any round after the 10<sup>th</sup>.

The payoff from playing the “always defect” strategy is given by the following expression:

$$\tilde{p}(N_i P + \frac{P}{1-\tilde{\delta}}) + (1-\tilde{p})(T + (N_i - 1)P + \frac{P}{1-\tilde{\delta}}) \quad (5)$$

Intuitively with probability  $\tilde{p}$  another “always defect” player is met which returns the payoff  $P$  for the full length of the game (a certain  $N$  periods plus an expected additional  $1/(1-\tilde{\delta})$  periods. Similarly with probability  $1-\tilde{p}$  a cooperating player is met which returns  $T$  just once, followed by  $P$  thereafter when that player switches to defect.

The payoff from playing “sophisticated cooperation” is given by:

$$\tilde{p}(S + (N_i - 1)P + \frac{P}{1-\tilde{\delta}}) + (1-\tilde{p})(N_i R + \frac{R}{1-\tilde{\delta}}) \quad (6)$$

The intuition is much the same. With probability  $\tilde{p}$  an “always defect” players is met returning the payoff  $S$  once and  $P$  thereafter. With probability  $1-\tilde{p}$  cooperation is sustained for the full duration of the game.

The probability that makes the individual indifferent between playing “sophisticated cooperation” and “always defect”,  $\bar{p}$ , can be calculated by equating expression 5 and expression 6; hence:

$$\bar{p}(\tilde{\delta}) = \frac{\frac{R-P}{1-\tilde{\delta}} - (N_i - 1)P + N_i R - T}{\frac{R-P}{1-\tilde{\delta}} - 2(N_i - 1)P + N_i P + N_i R - S - T} \quad (7)$$

so that *it is optimal to play a sophisticated cooperation strategy iff  $\tilde{p} < \bar{p}(\tilde{\delta})$ .*

Substituting  $R = 51; T = 63; S = 22; P = 39; N_i = 10$  and  $\tilde{\delta} = 0.5$ , we have

that the numerical value of the threshold is

$$\bar{p} = 0.876.$$

If individuals attribute different values to  $\delta$  and given that expression 7 is monotonically increasing in  $\tilde{\delta}$  for the above parameters, they will play more often always defect the smaller is  $\tilde{\delta}$ .

As before the accuracy in the calculation of  $\bar{p}$  depends on the computational capacity of the players, who may make mistakes in the calculation of the expected values of expression 5 and expression 6 or in the solution of the equation of the two expressions. Furthermore, individuals may misperceive the probability of termination after 10 rounds, considering a value  $\tilde{\delta}$  different from 0.5. We call  $\epsilon_d$  a mistake in the calculation of the game duration and we define *subjects with better capacity of calculation of the game duration as the ones for which it is more likely that  $\epsilon_d = 0$* .

Accordingly, each individual estimates  $\tilde{p}(\epsilon_c, \epsilon_d)$ , such that  $\tilde{p}(0, 0) = \bar{p}$ .

Now, considering *the cognitive channel* described in the introduction, and the above definitions in terms of subjects' cognitive capacities, we can make the following hypothesis: Subjects in the neutral mood treatment have:

- a better capacity to predict their partner's move
- a better computational capacity
- a better capacity to estimate the correct duration of the game

## I Chapter 3: Experiment Dates

Date	Total Session	Mood	Participants
22 June 2016	1	Happy	18
23 June 2016	2	Neutral	20
	3	Happy	16
28 June 2016	4	Neutral	16
	5	Happy	12
	6	Neutral	12
29 June 2016	7	Happy	18
30 June 2016	8	Neutral	16
		Total	128

## **J Chapter 3: Experiment Instructions**

### Verbal Instruction

Good morning/afternoon and thank you for coming to participate in our economic experiment. Before we begin, can you please confirm that the number on the card handed to you while coming in matches with the number on the cubicle that you are seated in. Just a few points before we begin:

1. Please read all the instructions carefully, there are 3 parts of the experiment and detailed instructions for each part will be coming on your screen.
2. In the first part, you will be asked to read some simple statements while listening to an audio track. You have been provided with headphones for this part of the experiment, you will need this only for the first part of the experiment, so you can keep it aside after that. Try turning the volume in your headphones to maximum if you cannot hear properly.
3. In the second part, you will take part in decision tasks and your payoff will be based on your performance in these tasks. You will be paid for one of these tasks, randomly chosen.
4. In the third and final part there will be some questions for you to answer.
5. Please do not talk to each other at any point, if you have any questions, raise your hand and the experimenter will come to you.
6. Also bear in mind that you may have to wait few moments during the experiment, as we want everyone to finish at the same time, you will see the message Please wait on your screen when this is applicable.
7. Any questions?

We will now begin the first part of the experiment.

Start General Instruction Mood- Positive/ Neutral (Screen Instructions)



Thank you for coming to participate in our economic experiment. By carefully reading the following instructions, you can - depending on your decisions - earn up to 20, including the show-up fee of 4. It is, therefore, of importance that you accurately read these instructions. During the whole experiment communication with other participants is not allowed. Therefore, we ask you to not speak with each other. If you do not understand something, please ask the experimenter by raising your hand. We will come to your place and answer your question individually.

Today's experiment consists of 3 parts. Detailed instructions for each part will follow.

In the first part, you will be asked to read some simple statements while listening to an audio track. You have been provided with headphones for this part of the experiment. In the second part, you will take part in decision tasks and your payoff will be based on your performance in these tasks. You will be paid for one of these tasks, randomly chosen. In the third and final part there will be some questions for you to answer. We will now begin the first part of the experiment.

(Mood Positive\*) In the first part of this experiment, you will be shown a series of screens with statements typed on them and you will hear some music in the background. The success of this part of the experiment will largely depend on your willingness to be receptive and responsive to the idea in each statement, and to allow each idea to act upon you without interference. These ideas are called suggestions. First, as each statement appears, you will simply read it to yourself, and then go over each statement again in your head with the determination and willingness to really believe it. You will try to experience each idea; you will concentrate your full attention on it and exclude other ideas which are unrelated to the mood; like, "I'll see if this will work." Following these statements, there will be a brief series of simple tasks to perform, and following those, there will be a brief questionnaire that you will have to answer.

(Mood Neutral\*) In the first part of this experiment, you will be shown a series

of screens with statements typed on them and you will hear some music in the background. The success of this part of the experiment will largely depend on your willingness to concentrate on each of the statements as they are placed before you, and make an effort to continue to do so until the next statement appears. First, as each statement appears, you will simply read it to yourself, then go over each statement again in your head with the determination and willingness to really believe it. Following these statements, there will be a brief series of simple tasks to perform, and following those, there will be a brief questionnaire that you will have to answer. Thank you for completing the first part. You can now take off your headphone and keep it aside. We will now proceed to the next part.

#### Start Encryption Task (Screen Instruction)

You will now participate in the encryption task. This task consists of encoding combinations of letters (words) into numbers. The three capital letters yield a word. You have to allocate a number to each capital letter. The encryption code can be found in a table below the corresponding letter. For that purpose, please consider the following screenshot:

In this example the participant has already encrypted the first letter correctly (see centered field: above). Here, the three capital letters: V, S and P have to be encoded. The solution follows immediately from the table: (see the current entry of the participant)

- For V applies: 108
- For S applies: 785
- For P applies: 537

To make an input please click on the blue box below the first capital letter. If all 3 numbers have been entered, please click the button OK. The experiment starts with a trial period in which each participant has to encrypt exactly 2 sets of letters. Please note: Correct solutions within the trial period will not be paid. After the

trial period, you will start the actual task that will last for 10 minutes. Each correct encryption corresponds to 1.

Thank you for completing the encryption task.

The next three tasks that you will face will involve making decisions in a pair and will give you the opportunity to amplify your payment from the encryption task. Only one of these three tasks will be chosen to calculate your final payment. The task will be chosen at random, in advance.

#### Start Task 1: Public Goods Game

**Screen Instruction** In this task you will make decisions in a pair. You will be randomly matched with another person in the room; both of your identities remain anonymous. You and your partner are presented with the same set of instructions. Your payoff from the task is dependent on the decisions you make as well as the decisions of other participant. For the purposes of this task, the money you have earned in the encryption task will be called your endowment. You will be given the choice of how much, if any, of this endowment to allocate toward the communal purchasing of a public good. The amount you and your partner contribute to the fund will be multiplied by 1.5 and then the total amount will be divided equally among the two of you. Your total payoff from this task depends on: (a) the total size of your endowment minus your contribution (b) the total amount in the group fund divided by 2 More explicitly, your individual payoff function is expressed as follows:  $\text{Your Payoff} = (\text{Your endowment} - \text{your contribution}) + [(\text{your contribution} + \text{your partners contribution}) \times 1.5 / 2]$  Task: What percentage of your endowment would you like to contribute to the public fund? Belief Elicitation: After you make your decision, you will be asked to state the likelihood you expect your partner to decide one action. Depending on how accurate you are when stating this likelihood you can earn additional experimental units that will be added to your eventual payoff. To determine the units earned we will use the following method: Your stated likelihood, call this "R", will be entered into the following formula where "r" de-

notes the realised action of your partner.  $1 - (R/100 - r/100)^2$ . This produces a number between 0 and 1. This number of units will then be multiplied by 2 and you will be paid that amount. Example: Assume you are guessing that your partner will contribute 60  $1 - (.60/100 - .40/100)^2 = 1 - (0.2)^2 = 0.96$  Thus 0.96 units will be multiplied by 1 to add to your final pay-off. Note that the closer your estimate is to the real action of your partner, the more units you stand to earn. It is in your best interest to state what you truly think the other person will do. You will be paid for one of the likelihood estimation, chosen randomly.

Start Task 2 and 3: Trust Game: Sender and Receiver strategy

Screen Instruction: In this task you will make decisions in a pair. You will be randomly matched with another person in the room; both of your identities remain anonymous. You and your partner is presented with the same set of instructions. Your payoff from the task is dependent on the decisions you make as well as the decisions of other participant.

For the purposes of this task, the money you have earned in the encryption task will be called your endowment. You will be assigned the role of either a Sender or a Receiver. If you are the Sender you can choose to send some percentage (0% to 100%) of your endowment to the Receiver. The amount you choose to send will be doubled by the experimenter. The Receiver has the option to return some percentage (0% to 100%) of the amount that he/she received back to you.

So, if you are the sender, your payoff from this task depends on:

- (a) the total size of your endowment minus your offer to your partner
- (b) the amount your partner returns from the amplified amount

More explicitly, your individual payoff function is expressed as follows: Your Pay-off = your endowment - your offer + the amount your partner returns

If you are the Receiver, your total payoff from this task depends on:

- (a) the total size of your endowment
- (b) amount your partner sends you minus what you decide to return

More explicitly, your individual payoff function is expressed as follows: Your Pay-off= Your endowment + (the amount your partner sends x 2) - the amount you return

If you are the Sender, you will be given the choice of how much, if any, of your endowment to give to your partner. If you are the Receiver, you will have to decide how much, if any, of the amount you receive from your partner to return to your partner.

The next screen you see will ask you to choose a percentage of your endowment that you would like to send to your partner. This can be from 0% to 100%

Sender offer: If you are the Sender, what percentage of your endowment would you like to send to your partner?

Sender belief about Receiver: What percentage of the amount the Receiver receives do you think he/she will return to you? (Out of 100)

Responder return: If you are the Receiver, what percentage of the amount you receive would you like to send back to the Sender?

Responder belief about Sender: What percentage of your partner's (Senders) endowment do you think he/she will send to you? (Out of 100)

Start Questionnaire.

- Personal Information:
- GMAT questions
- Risk Elicitation: DOSPERT (30 item)
- Social Risk and Trust questions
- Mood, life good and political belief
- Life tragedy

K Chapter 3: Encryption Task

Encryption

Remaining time [sec]: 112

You currently encrypt word number 1

WORD: Z

M

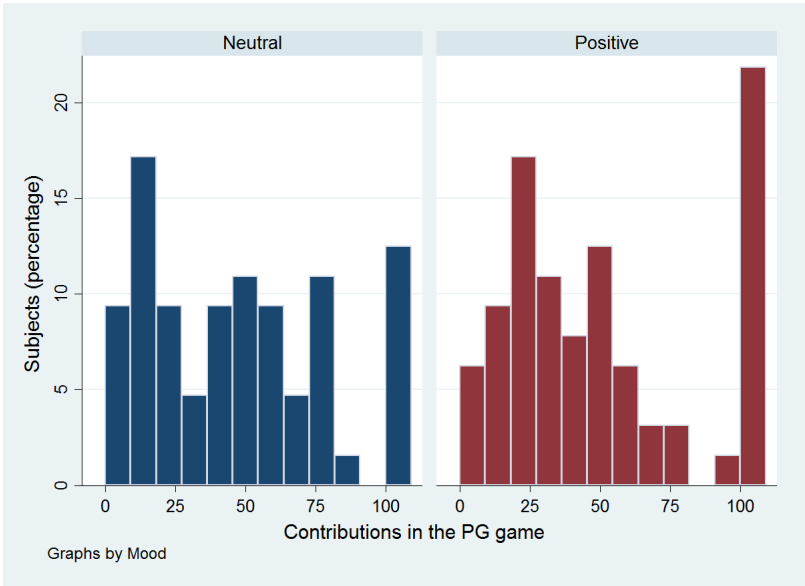
R

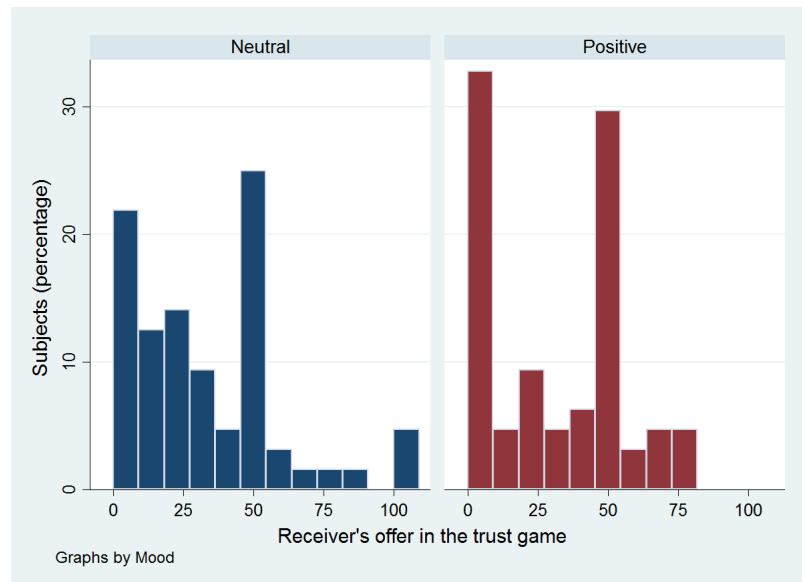
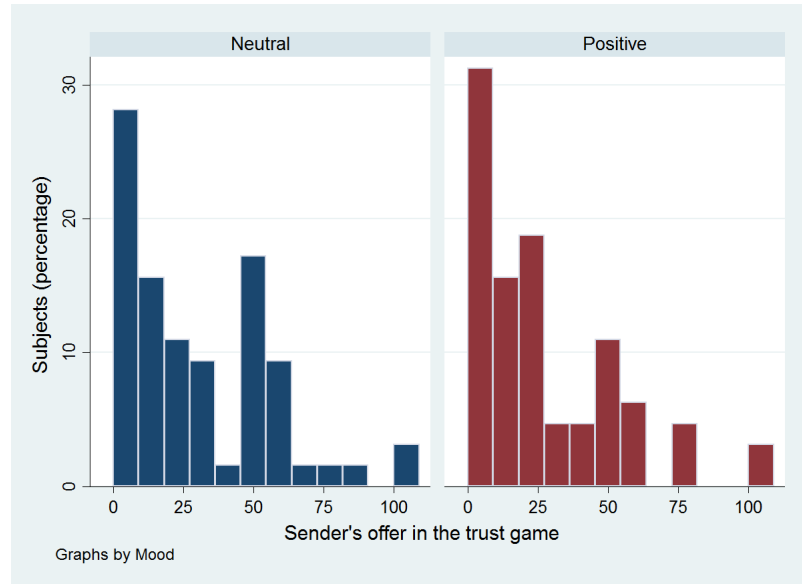
CODE: 867

J	H	M	W	Q	D	B	O	S	U	A	I	R	P	V	L	C	N	G	T	X	Y	K	F	E	Z
978	479	805	527	337	867	549	766	572	448	920	582	185	238	287	695	267	885	150	957	923	885	684	293	529	867

OK

L Chapter 3: Histogram of offers





## M Chapter 3: GMAT questions

1. Harriet wants to put up fencing around three sides of her rectangular yard and leave a side of 20 feet unfenced. If the yard has an area of 680 square feet, how many feet of fencing does she need?
2. If  $x + 5y = 16$  and  $x = -3y$ , then  $y = ?$
3. If basis points are defined so that 1 percent is equal to 100 basis points, then 82.5 percent is how many basis points greater than 62.5 percent?
4. Which of the following best completes the passage below?

In a survey of job applicants, two-fifths admitted to being at least a little dishonest. However, the survey may underestimate the proportion of job applicants who are dishonest, because.

- a) some dishonest people taking the survey might have claimed on the survey to be honest.
  - b) some generally honest people taking the survey might have claimed on the survey to be dishonest.
  - c) some people who claimed on the survey to be at least a little dishonest may be very dishonest.
  - d) some people who claimed on the survey to be dishonest may have been answering honestly.
  - e) some people who are not job applicants are probably at least a little dishonest.
5. People buy prestige when they buy a premium product. They want to be associated with something special. Mass-marketing techniques and price-reduction strategies should not be used because .



- a) affluent purchasers currently represent a shrinking portion of the population of all purchasers.
- b) continued sales depend directly on the maintenance of an aura of exclusivity.
- c) purchasers of premium products are concerned with the quality as well as with the price of the products.
- d) expansion of the market niche to include a broader spectrum of consumers will increase profits.
- e) manufacturing a premium brand is not necessarily more costly than manufacturing a standard brand of the same product.

## N Velten Statements

### Statements for positive mood subjects

1. Today is neither better nor worse than any other day.
2. I do feel pretty good today, though.
3. I feel light hearted.
4. This might turn out to have been one of my good days.
5. If your attitude is good, then things are good, and my attitude is good.
6. I've certainly got energy and self-confidence to spare.
7. I feel cheerful and lively.
8. On the whole, I have very little difficulty in thinking clearly.
9. For the rest of the day, I bet things will go really well.
10. I am pleased that most people are so friendly to me.
11. My judgement about most things is sound.
12. I am full of energy and ambition; I feel like i could go a long time without sleep
13. This is one of those days when I can grind out school work with practically no effort at all.
14. My judgement is keen and precise today; just let someone try to put something over on me.
15. If I set my mind to it, I can make things turn out fine.
16. I feel enthusiastic and confident now.
17. Some of my friends are so lively and optimistic.
18. I feel talkative; i feel like talking to almost anybody.
19. I am full of energy, and I am really getting to like the things Im doing on campus.
20. I am able to do things accurately and efficiently.
21. I know good and well that I can achieve the goals I set.
22. Now that it occurs to me, most of the things that have depressed me wouldn't have if Id just had the right attitude.

23. I have a sense of power and vigour.
24. I feel so vivacious and efficient today; sitting on top of the world.
25. It would really take something to stop me now!
26. In the long run, it's obvious that things have gotten better and better during my life.
27. I know that in the future i won't over-emphasize so-called "problems".
28. I am optimistic that I can get along very well with most of the people I meet
29. I am too absorbed in things to have time for worry.
30. I am feeling amazingly good today!
31. I am particularly inventive and resourceful in this mood.
32. I feel superb! I think I can work to the best of my ability.
33. I can find good in almost anything.
34. I feel so happy and playful today I feel like surprising someone by telling a silly joke.
35. I feel an exhilarating animation in all I do.
36. I feel highly perceptive and refreshed.
37. In a buoyant mood like this one, I can work fast and do it right the first time.
38. I can concentrate hard on anything I do.
39. My thinking is clear and rapid.
40. Life is so much fun; it seems to offer so many sources of fulfilment.
41. I feel industrious as heck; I want something to do!
42. I can make decisions rapidly and correctly and I can defend them against criticism easily.
43. Life is firmly in my control.
44. I wish somebody would play some good loud music!
45. This is great; I really do feel good, I feel elated about things.
46. I am really feeling sharp now.
47. This is just one of those days when I am ready to go!

48. I feel like bursting out with laughter; I wish somebody would tell a joke and give me an excuse!

49. I am full of energy

50. God, I feel great!

### **Statements for neutral mood subjects**

1. Oklahoma City is the largest city in the world in area, with 631.166 square miles.
2. At the end appears a section entitled "bibliography notes."
3. We have two kinds of nouns denoting physical things: individual and mass nouns.
4. This book or any part thereof must not be reproduced in any form.
5. Agricultural products comprised seventy per cent of the income.
6. Saturn is sometimes in conjunction, beyond the sun from the earth, and is not visible.
7. Some streets were still said to be listed under their old names.
8. The system is supervised by its board of regents.
9. There is a large rose-growing centre near Tyler, Texas.
10. The typography, paper and bind were of the highest quality.
11. The machine dominated county posts for as long as anyone could remember.
12. The desk was old and scratched into its surface was a profusion of dates, initials, and leading messages.
13. The Orient Express travels between Paris and Istanbul.
14. When the banyan bent down under its own weight, its branches began to take root.
15. The Hope Diamond was shipped from South Africa to London through the regular mail service.
16. The review is concerned with the first three volumes.
17. The ship was ancient, and would soon be retired from the fleet.
18. Slang is a constantly changing part of the language.
19. There is a small article in the local newspaper which indicates acceptance of the

kidnappers' terms.

20. There are some forms in which no oath is required.
21. Two men dressed as repairmen will appear shortly after the van pulls up.
22. The wood was discoloured as if it had been held in a fire.
23. A light was noticed in the dark outside, and it moved eerily towards the house.
24. Painting in a few other non-European countries is treated in a separate volume.
25. Provoked arousal and orientation are accompanied by steeper negative shifts.
26. The names on the Christmas mailing list are alphabetically ordered.
27. Significantly, these changes occur during the full moon.
28. West Samoa gained its independence in 1965.
29. The magazine's report was slanted, as usual.
30. The map would prove useless as a beginning guide.
31. The speaker outlined a plan whereby the current deficits could be eliminated.
32. Black and white pictures are arranged in ten sections.
33. The papers had been front-paging it for days.
34. The notice made it clear that coffee breaks were being limited.
35. No man worked harder than he.
36. Potter wrote numerous satires on social cynicism.
37. Boeing's main plant in Seattle employs 35,000 people.
38. The doorkeeper was dressed in red.
39. During the next ten years, the group participated in politics.
40. The organization depended on the people for support.
41. In 1965, Elizabeth made the first state visit by a British monarch to Germany in 56 years.
42. It was their sixth consecutive best seller.
43. It all fitted in with the officer's story.
44. The merger did not change the company's policy.
45. The mansion was rented by the delegation.

- 46. Changes were made in transport of lumber after the border incident.
- 47. The Chinese language has many dialects, including Cantonese, Mandarin, and Wu.
- 48. Things were booming once again in the little cold rush town of angel.
- 49. At low tide the hulk of the old ship could be seen.
- 50. A free sample will be given to each person who enters the store.

## O Big Five Personality

### BIG FIVE INVENTORY (BFI)

#### Reference

John, O. P., & Srivastava, S. (1999). [The Big-Five trait taxonomy: History, measurement, and theoretical perspectives](#). In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (Vol. 2, pp. 102–138). New York: Guilford Press.

#### Description of Measure:

44-item inventory that measures an individual on the Big Five Factors (dimensions) of personality (Goldberg, 1993). Each of the factors is then further divided into personality facets.

The Big Five Factors are (chart recreated from John & Srivastava, 1999):

Big Five Dimensions	Facet (and correlated trait adjective)
Extraversion vs. introversion	Gregariousness (sociable) Assertiveness (forceful) Activity (energetic) Excitement-seeking (adventurous) Positive emotions (enthusiastic) Warmth (outgoing)
Agreeableness vs. antagonism	Trust (forgiving) Straightforwardness (not demanding) Altruism (warm) Compliance (not stubborn) Modesty (not show-off) Tender-mindedness (sympathetic)
Conscientiousness vs. lack of direction	Competence (efficient) Order (organized) Dutifulness (not careless) Achievement striving (thorough) Self-discipline (not lazy) Deliberation (not impulsive)
Neuroticism vs. emotional stability	Anxiety (tense) Angry hostility (irritable) Depression (not contented) Self-consciousness (shy) Impulsiveness (moody) Vulnerability (not self-confident)
Openness vs. closedness to experience	Ideas (curious) Fantasy (imaginative) Aesthetics (artistic) Actions (wide interests) Feelings (excitable) Values (unconventional)

For more information about the Big Five, visit this website:

<http://www.uoregon.edu/~sanjay/bigfive.html#where>

Self Report Measures for Love and Compassion Research: *Personality*



Fetzer Institute

### Abstracts of Selected Related Articles:

Bouchard, T. J. & McGue, M. (2003). Genetic and environmental influences on human psychological differences. *Journal of Neurobiology*, 54, 4-45.

Psychological researchers typically distinguish five major domains of individual differences in human behavior: cognitive abilities, personality, social attitudes, psychological interests, and psychopathology (Lubinski, 2000). In this article we: discuss a number of methodological errors commonly found in research on human individual differences; introduce a broad framework for interpreting findings from contemporary behavioral genetic studies; briefly outline the basic quantitative methods used in human behavioral genetic research; review the major criticisms of behavior genetic designs, with particular emphasis on the twin and adoption methods; describe the major or dominant theoretical scheme in each domain; and review behavioral genetic findings in all five domains. We conclude that there is now strong evidence that virtually all individual psychological differences, when reliably measured, are moderately to substantially heritable.

Tkach, C., & Lyubomirsky, S. (2006). How do people pursue happiness?: Relating personality, happiness-increasing strategies, and well-being. *Journal of Happiness Studies*, 7, 183-225.

Five hundred ethnically diverse undergraduates reported their happiness strategies – that is, activities undertaken to maintain or increase happiness. Factor analysis extracted eight general strategies: Affiliation, Partying, Mental Control, Goal Pursuit, Passive Leisure, Active Leisure, Religion, and Direct Attempts at happiness. According to multiple regression analyses, these strategies accounted for 52% of the variance in self-reported happiness and 16% over and above the variance accounted for by the Big Five personality traits. The strongest unique predictors of current happiness were Mental Control (inversely related), Direct Attempts, Affiliation, Religion, Partying, and Active Leisure. Gender differences suggest that men prefer to engage in Active Leisure and Mental Control, whereas women favor Affiliation, Goal Pursuit, Passive Leisure, and Religion. Relative to Asian and Chicano(a) students, White students preferred using high arousal strategies. Finally, mediation analyses revealed that many associations between individuals' personality and happiness levels are to some extent mediated by the strategies they use to increase their happiness – particularly, by Affiliation, Mental Control, and Direct Attempts.

Shiota, M.N., Keltner, D., & John, O. P. (2006). Positive emotion dispositions differentially associated with Big Five personality and attachment style. *The Journal of Positive Psychology*, 1, 61-71.

Although theorists have proposed the existence of multiple distinct varieties of positive emotion, dispositional positive affect is typically treated as a unidimensional variable in personality research. We present data elaborating conceptual and empirical differences among seven positive emotion dispositions in their relationships with two core personality constructs, the “Big Five” and adult attachment style. We found that the positive emotion dispositions were differentially associated with self- and peer-rated Extraversion, Conscientiousness, Agreeableness, Openness to Experience, and Neuroticism. We also found that different adult attachment styles were associated with different kinds of emotional rewards. Findings support the theoretical utility of differentiating among several dispositional positive emotion constructs in personality research.



Scale:

### The Big Five Inventory (BFI)

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

Disagree strongly 1	Disagree a little 2	Neither agree nor disagree 3	Agree a little 4	Agree Strongly 5
---------------------------	---------------------------	------------------------------------	------------------------	------------------------

I see Myself as Someone Who...

- |  |  |
|--|--|
| ___ 1. Is talkative                            | ___ 23. Tends to be lazy                           |
| ___ 2. Tends to find fault with others         | ___ 24. Is emotionally stable, not easily upset    |
| ___ 3. Does a thorough job                     | ___ 25. Is inventive                               |
| ___ 4. Is depressed, blue                      | ___ 26. Has an assertive personality               |
| ___ 5. Is original, comes up with new ideas    | ___ 27. Can be cold and aloof                      |
| ___ 6. Is reserved                             | ___ 28. Perseveres until the task is finished      |
| ___ 7. Is helpful and unselfish with others    | ___ 29. Can be moody                               |
| ___ 8. Can be somewhat careless                | ___ 30. Values artistic, aesthetic experiences     |
| ___ 9. Is relaxed, handles stress well         | ___ 31. Is sometimes shy, inhibited                |
| ___ 10. Is curious about many different things | ___ 32. Is considerate and kind to almost everyone |
| ___ 11. Is full of energy                      | ___ 33. Does things efficiently                    |
| ___ 12. Starts quarrels with others            | ___ 34. Remains calm in tense situations           |
| ___ 13. Is a reliable worker                   | ___ 35. Prefers work that is routine               |
| ___ 14. Can be tense                           | ___ 36. Is outgoing, sociable                      |
| ___ 15. Is ingenious, a deep thinker           | ___ 37. Is sometimes rude to others                |
| ___ 16. Generates a lot of enthusiasm          | ___ 38. Makes plans and follows through with them  |
| ___ 17. Has a forgiving nature                 | ___ 39. Gets nervous easily                        |
| ___ 18. Tends to be disorganized               | ___ 40. Likes to reflect, play with ideas          |
| ___ 19. Worries a lot                          | ___ 41. Has few artistic interests                 |

- |                                    |  |
|------------------------------------|--|
| ____ 20. Has an active imagination | ____ 42. Likes to cooperate with others                |
| ____ 21. Tends to be quiet         | ____ 43. Is easily distracted                          |
| ____ 22. Is generally trusting     | ____ 44. Is sophisticated in art, music, or literature |

**Scoring:**

BFI scale scoring ("R" denotes reverse-scored items):

Extraversion: 1, 6R, 11, 16, 21R, 26, 31R, 36  
 Agreeableness: 2R, 7, 12R, 17, 22, 27R, 32, 37R, 42  
 Conscientiousness: 3, 8R, 13, 18R, 23R, 28, 33, 38, 43R  
 Neuroticism: 4, 9R, 14, 19, 24R, 29, 34R, 39  
 Openness: 5, 10, 15, 20, 25, 30, 35R, 40, 41R, 44

## P Risk Preference DOSPERT item

The DOSPERT Scale (from Blais, & Weber, 2006)

For each of the following statements, please indicate the **likelihood** that you would engage in the described activity or behavior if you were to find yourself in that situation. Provide a rating from *Extremely Unlikely* to *Extremely Likely*, using the following scale:

1	2	3	4	5	6	7
Extremely Unlikely	Moderately Unlikely	Somewhat Unlikely	Not Sure	Somewhat Likely	Moderately Likely	Extremely Likely

1. Admitting that your tastes are different from those of a friend. (S)
2. Going camping in the wilderness. (R)
3. Betting a day's income at the horse races. (F/G)
4. Investing 10% of your annual income in a moderate growth diversified fund. (F/I)
5. Drinking heavily at a social function. (H/S)
6. Taking some questionable deductions on your income tax return. (E)
7. Disagreeing with an authority figure on a major issue. (S)
8. Betting a day's income at a high-stake poker game. (F/G)
9. Having an affair with a married man/woman. (E)
10. Passing off somebody else's work as your own. (E)
11. Going down a ski run that is beyond your ability. (R)
12. Investing 5% of your annual income in a very speculative stock. (F/I)
13. Going whitewater rafting at high water in the spring. (R)
14. Betting a day's income on the outcome of a sporting event (F/G)
15. Engaging in unprotected sex. (H/S)
16. Revealing a friend's secret to someone else. (E)
17. Driving a car without wearing a seat belt. (H/S)
18. Investing 10% of your annual income in a new business venture. (F/I)
19. Taking a skydiving class. (R)
20. Riding a motorcycle without a helmet. (H/S)
21. Choosing a career that you truly enjoy over a more secure one. (S)
22. Speaking your mind about an unpopular issue in a meeting at work. (S)
23. Sunbathing without sunscreen. (H/S)
24. Bungee jumping off a tall bridge. (R)
25. Piloting a small plane. (R)
26. Walking home alone at night in an unsafe area of town. (H/S)
27. Moving to a city far away from your extended family. (S)
28. Starting a new career in your mid-thirties. (S)
29. Leaving your young children alone at home while running an errand. (E)
30. Not returning a wallet you found that contains \$200. (E)

*Note.* E = Ethical, F = Financial, H/S = Health/Safety, R = Recreational, and S = Social.